African Invertebrates Vol. 48 (2) Pages 121–165 Pietermaritzburg December, 2007

Revision of the bees of the *Colletes fasciatus*-group in southern Africa (Hymenoptera: Colletidae)

Michael Kuhlmann

Institute of Landscape Ecology, University of Münster, Robert-Koch-Str. 26,
D-48149 Münster, Germany; kuhlmmi@uni-muenster.de

ABSTRACT

The *Colletes fasciatus* species-group is revised. It is endemic to the winter rainfall area of South Africa and Namibia, and comprises 25 species, eleven of which are here described as new: *C. abnormis* sp. n., *C. bokkeveldi* sp. n., *C. cyanonitidus* sp. n., *C. eardleyi* sp. n., *C. gessi* sp. n., *C. karooensis* sp. n., *C. katharinae* sp. n., *C. knersvlaktei* sp. n., *C. nieuwoudtvillei* sp. n., *C. watmoughi* sp. n. and *C. zygophyllum* sp. n. *Colletes montacuti* Cockerell, 1947 is synonymised under *C. albohirtus* Cockerell, 1946. All species are redescribed and an identification key is provided.

KEY WORDS: Hymenoptera, Colletidae, *Colletes*, bees, southern Africa, systematic revision, new species.

INTRODUCTION

The genus *Colletes* Latreille, 1802 currently includes 445 described species with an estimated total of about 700 species (Kuhlmann unpubl.) world-wide except for Antarctica, Australia, Madagascar and Southeast Asia (Michener 1979, 2000). Approximately 54 *Colletes* species are described from sub-Saharan Africa (Kuhlmann 1998, 2002) but the real number is more than twice as many. The monophyly of *Colletes* is supported by the outwardly arcuate posterior part of the second recurrent vein, and by the base of the propodeum that has a short subhorizontal to vertical basal zone, which usually is limited posteriorly by a carina or sharp change in slope or sculpture, and divided by a longitudinal carina (Michener 1989). Among the African Colletidae, the genus *Colletes* is easily identified by having three submarginal cells and abundant long hair at least on the head and mesosoma. The males are characterised by having greatly enlarged apicolateral lobes of the internal 7th sternum (S7), whose morphological variation proves useful for specific identification.

The present study is the first part of a revision of the afrotropical *Colletes* species and is based on earlier type examinations (Kuhlmann 1998). It deals with the morphologically well characterised *C. fasciatus* species-group. Eleven species of this group have reduced scopae, a unique feature among the genus. Two stages of scopa reduction can be distinguished, possibly representing consecutive steps towards a total loss of specialised hairs on the hind legs. Scopal morphology is described, and a hypothetical scenario for the evolution of scopa reduction based on flower preferences, considering the harsh environmental conditions during the flowering season in winter and early spring, is discussed elsewhere (Kuhlmann 2006).

The *C. fasciatus*-group is confined to the winter rainfall area of South Africa and southern Namibia. Some species also invade the southern Cape region, which has rain all year. The isolated records of *C. obscurus* Friese from Abercorn (= Mbala, northern Zambia) and Zeerust (North West Province, South Africa) are located in a totally different environment (i.e. summer rainfall, savannah areas). These distribution records probably result from a confusion of the localities or mislabelling. The same is obviously true for single specimens of *C. genalis* Friese and *C. testaceipes* Friese collected by Volkmann in 1903 in 'Grotfontein' (= Grootfontein, Namibia). These records are far from their known distribution ranges and the biomes they usually inhabit. Possibly these bees were collected during an expedition of the army captain Richard Volkmann to the south-western part of the former German colony, South West Africa (= Namibia). All species are redescribed to facilitate reliable identification. As is usual for most *Colletes*, the females of this group are often difficult to identify, but most males are easily distinguishable by the shape of S7 and the gonostylus.

Species of the *C. fasciatus*-group are rarely collected and many species are only known from a few specimens. Their rarity, the high degree of sexual dimorphism within the group, and the morphological similarity of most species, make sex association difficult. Of the 25 species treated in this study, only 10 are known from both male and female specimens. For this reason I decided to exclude provisionally the few specimens of six female and four male morphotypes, each clearly representing a separate species. It has been impossible for me to decide whether they are the opposite sex of one of the described species, or if they represent new species. To avoid the production of synonyms, they are omitted here. Sex association was usually possible when males and females were collected on the same date at the same locality, and in species with unusual morphological features (i.e. exceptionally long malar area, punctation of metasomal terga, patterns of vestiture).

Another consequence of the rarity of these bees, and problems with sex associations, is the recognition of closely related species groups within the *C. fasciatus*-group. It is known that the shape of the male S7 provides reliable identification of monophyletic groups in northern hemisphere *Colletes* (Noskiewicz 1936; Stephen 1954). Within the *C. fasciatus* group the known males can be arranged, too, in distinct sub-groups based on characters of S7 and the genitalia. However, I have been unable to identify such characters in the females. Thus, a coherent system of (monophyletic) groups including all species is at present unavailable. Therefore the species are preliminarily arranged alphabetically.

MATERIAL AND METHODS

Morphological terminology mainly follows that of Michener (1944). The abbreviations T and S are used in the descriptions of the metasomal terga and sterna, respectively. Tergal depressions are the depressed posterior margins of terga that are often entirely covered by the posterior tergal hair bands. The facial fovea is an elliptical, usually concave area adjacent to the upper inner eye margin. Its sculpture often differs from that of the surrounding integument. Descriptions and body measurements are based on the whole series of type material. Illustrations of male genitalia and S7 are based on a dissected paratype. Terminalia were extracted and mounted on a card pinned below the specimen. The density of punctation and intervals between the punctures was based on relative puncture diameter: pd (e.g. < 2 pd = less than 2× the puncture diameter between the punctures). For electron microscopy the samples were mounted on stubs, coated with gold and observed with a LEO 1430 scanning electron microscope.

Distribution maps include the localities of material studied during this revision. The coordinates of localities are listed in a gazetteer in Appendix 1.

Material examined is in the following institutions and private collections: Albany Museum, Grahamstown (AMGS); American Museum of Natural History, New York (AMNH); Bee Biology and Systematics Laboratory, Utah State University, Logan (BLCU); Natural History Museum, London (BMNH); South African Museum, Cape Town (SAMC); South African National Collection of Insects, Pretoria (SANC); Snow Entomological Museum, University of Kansas, Lawrence (SEMC); Transvaal Museum, Pretoria (TMSA); Zoologisches Museum der Humboldt Universität, Berlin (ZMHB); Cornell University Insect Collection, Ithaca (CUIC); private collection of Carolin Mayer, Hamburg (CCM); private collection of Michael Kuhlmann, Münster (CMK).

TAXONOMY

The Colletes fasciatus-*group*

The species group is named after *C. fasciatus*, the first described representative of this group that was described by Smith (1853). Species of this group are isolated among the *Colletes* of the eastern hemisphere and North America by a characteristic combination of morphological features. Interestingly, a few South American *Colletes* show a close resemblance to species of the *C. fasciatus*-group, but at present it is unclear if this is an indicator for a phylogenetic relationship, or is caused by convergent evolution. Thus, a detailed study of the rich but little known South American *Colletes* fauna is needed to confirm the status of the below-mentioned features as synapomorphies of the *C. fasciatus*-group.

Both sexes are characterised by an oval-shaped metasoma with T1 being fairly close to regularly rounded anteriorly, and with the broadest part approximately in the middle of T2. T1 is slightly shortened compared with other *Colletes* species. In the males the tip of T7 is narrowly rounded (except for *C. inornatus* and *C. testaceipes*) and often slightly protruding. The surface of the metasoma often has a bluish shine. The discs of all terga are densely covered with long erect hairs. In the males of all species, except for *C. genalis*, *C. testaceipes* and two of the undescribed specimens, the hind basitarsus is more or less broadened and sometimes partly modified (e.g. curved or crested), except in *C. genalis* and an undescribed male where the gonostylus and the wings of the penis valves are modified (e.g. elongate, reduced, broadened), extremely so in some species. In about half of the species the males have elongate antennae and swollen femorae and mid tibiae. In the females, the clypeal protuberance, in profile, is at least 3/4 of the width of the eye (less only in *C. gessi*). The clypeus is strongly and regularly convex (Fig. 1) (except in *C. gessi*) and in *C. cyanonitidus* it has a slight longitudinal, median depression.

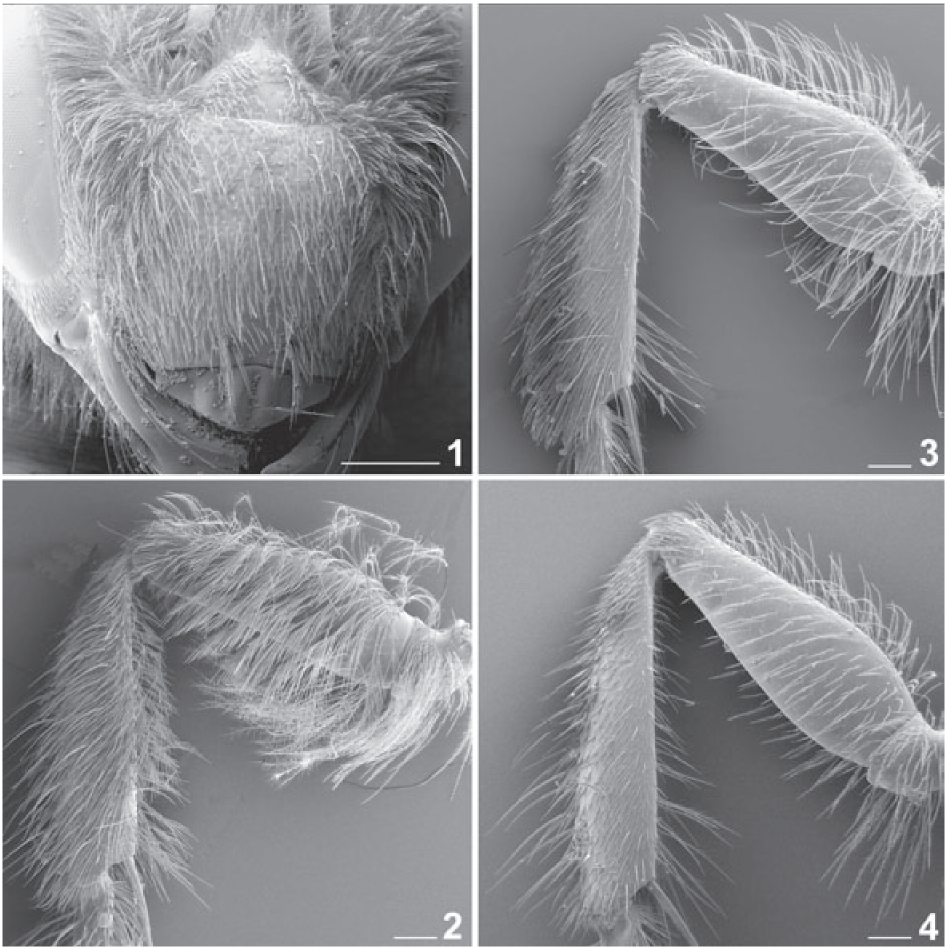
Key to the species of the *Colletes fasciatus*-group

1 Females: antennal flagellum with ten segments; metasoma with six visible terga 2

– Males: antennal flagellum 11-segmented; metasoma with seven visible terga 19

2 Hind femur and tibia with reduced scopa (Figs 3, 4) 3

– Hind femur and tibia with well developed scopa (Fig. 2) 11



Figs 1–4. (1) *Colletes albohirtus*, clypeus of female, frontal view; (2) *C. genalis*, scopa on hind leg of female, dorsal view; (3) *C. laticaudus*, partly reduced scopa on hind leg of female, dorsal view; (4) *C. karooensis* sp. n., reduced scopa on hind leg of female, dorsal view. Scale bars: Fig. 1 = 0.5 mm; Figs 2–4 = 0.2 mm.

3 Hind femur largely orange-brown to red; in many species legs completely orange-brown to red 4

– Hind legs black to dark brown; tarsus sometimes red-brown 8

4 Fore and mid tibiae largely or completely blackish or brownish, sometimes to a small extent reddish 5

– Fore and mid tibiae completely orange-brown to red, sometimes blackish or brownish basally and/or apically 6

5 T1 with area between punctures finely shagreened, dull; apical tergal depressions broadly translucent and disc posteriorly with narrow red margin; T6 narrowly rounded apically .... **infracognitus** Cockerell

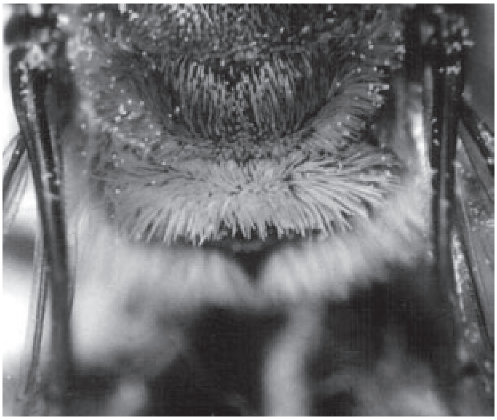


Fig. 5. *Colletes cyanonitidus* sp. n., propodeum of female, dorsal view.

– T1 with area between punctures smooth and shiny; only apical tergal depressions narrowly translucent; T6 broadly rounded apically .... **stellatus** Cockerell

6 Maximum width of facial fovea about diameter of antennal flagellum .... **eardleyi** sp. n.

– Maximum width of facial fovea about 2× diameter of antennal flagellum 7

7 Apical hair bands of terga broad, medially nearly completely covering depression; hairs on disc of mesonotum long, about 2× as long as diameter of antennal flagellum .... **testaceipes** Friese

– Apical hair bands of terga narrow, medially covering only about posterior half of depression; hairs on disc of mesonotum short, about as long as diameter of antennal flagellum .... **albohirtus** Cockerell

8 Hind tibia with dense short hairs dorsally (Fig. 3); apical tergal depressions broadly translucent yellowish to reddish .... **laticaudus** Cockerell

– Hind tibia without dense short hairs (Fig. 4); apical tergal depressions narrowly translucent reddish to brownish 9

9 Metanotum medially with course and short, erect hairs (Fig. 2) 10

– Metanotum medially with thin, longer hairs .... **karooensis** sp. n.

10 Propodeal triangle entirely covered with coarse transverse carinae...... **obscurus** Friese

– Propodeal triangle dorsally with few, very weak transverse carinae .... **cyanonitidus** sp. n.

11 Apical hair band of T2 as broad as disc; in *C. zygophyllum* sp. n. width of apical hair band about 2/3 width of disc and scutellum with abundant black hairs 12

– Apical hair bands of T2 only about 1/4 width of disc; in *C. abnormis* sp. n. width of apical hair band about 1/2 width of disc and scutellum without black hairs 15

12 Apical tergal depressions distinctly translucent and disc posteriorly with narrow red margin .... **aureocinctus** Cockerell

– Apical tergal depressions weakly translucent, disc completely black 13

13 Apical hair bands of terga whitish .... **zygophyllum** sp. n.
– Apical hair bands of terga yellowish brown or brownish orange 14

14 Apical hair bands of terga brownish orange; that on T3 broader, maximum width 2× width of hind basitarsus .... **fasciatus** Smith
– Apical hair bands of terga yellowish brown; on T3 narrower, maximum width 1.5–1.7× width of hind basitarsus .... **latefasciatus** Friese

15 Malar area short, less than half as long as width of base of mandible 16
– Malar area long, about as long as width of base of mandible or longer 17

16 Apical hair bands of terga narrow; that on T3 medially slightly narrower than width of hind basitarsus; scutellum with black hairs .... **gessi** sp. n.
– Apical hair bands of terga broad; that on T3 medially slightly broader than width of hind basitarsus; scutellum without black hairs .... **abnormis** sp. n.

17 Apical hair bands of terga narrow; on T2 medially about half as wide as width of hind basitarsus; malar area slightly shorter than basal width of mandible .... **cardiurus** Cockerell
– Apical hair bands of terga broad; on T2 medially about as broad as width of hind basitarsus; malar area as broad or broader than basal width of mandible 18

18 Malar area shorter, about as long as basal width of mandible; supraclypeal area shiny, surface between punctures smooth .... **wathmoughi** sp. n.
– Malar area longer, about 1.5× longer than basal width of mandible; supraclypeal area dull, surface between punctures finely shagreened .... **genalis** Friese

19 S6 with a large lateral tooth directed backwards 20
– S6 without teeth 22

20 Gonostylus bifurcate (Fig. 29), S7 as in Fig. 28 .... **knersvlaktei** sp. n.
– Gonostylus simple 21

21 Gonostylus very narrow (Fig. 27), S7 as in Fig. 26 .... **schultzei** Friese
– Gonostylus thick (Fig. 23), S7 as in Fig. 22 .... **fasciatus** Smith

22 Mid femora broadest near base, forming a near right-angled edge ventrally 23
– Mid femora not broadest near their base and not forming a right-angled edge ventrally 25

23 S7 longer than broad (Fig. 33), gonostylus as in Fig. 32 .... **nieuwoudtvillei** sp. n.
– S7 broader than long (Figs 12, 14), gonostylus not as shown as in Fig. 32 24

24 Gonostylus as in Fig. 13, S7 as in Fig. 12 .... **bokkeveldi** sp. n.
– Gonostylus shorter than that of *C. bokkeveldi* (Fig. 15), S7 as in Fig. 14 .... **gessi** sp. n.

25 Hind tarsal segment 2 elongate and slender, more than 3× longer than broad, S7 and gonostylus as in Figs 30, 31, respectively .... **cyanonitidus** sp. n.
– Hind tarsal segment 2 shorter and wide, at most 1.5× as long as broad 26

26 Gonostylus bifurcate 27
– Gonostylus simple 28

27 Gonostylus as in Fig. 37 and S7 long (Fig. 36) .... **denudatus** Cockerell
– Gonostylus as in Fig. 35 and S7 short (Fig. 34) .... **katharinae** sp. n.

28 Lobes of S7 strongly emarginate apically (Figs 6, 8, 38) 29
– Lobes of S7 different, only slightly emarginate apically or without emargination 31

29 Lobes of S7 with a single emargination (Fig. 38), gonostylus as in Fig. 39 .... **karooensis** sp. n.
– Lobes of S7 with two emarginations apically (Figs 6, 8) 30

30 Gonostylus broad (Fig. 9), S7 as in Fig. 8 .... **inornatus** Cockerell
– Gonostylus narrow (Fig. 7), S7 as in Fig. 6 .... **abnormis** sp. n.

31 Scutellum and inner eye margins with black hairs intermixed .... **genalis** Friese
– Scutellum and inner eye margins without black hairs 32

32 Tarsi completely and tibiae at least partly light yellowish to pale reddish brown .... **testaceipes** Friese
– Tarsi and tibiae black, sometimes partly dark reddish brown 33

33 Hind basitarsus slightly emarginate to concave ventrally .... **albohirtus** Cockerell
– Ventral margins of hind basitarsus straight 34

34 Apical hair bands of S2 and S3 medially consisting of very short, dense pilosity, gonostylus and S7 as in Figs 24, 25, respectively .... **laticaudus** Cockerell
– Apical hairbands of S2 and S3 medially consisting of a few long hairs; gonostylus and S7 as in Figs 20, 21, respectively .... **aureocinctus** Cockerell

Colletes abnormis sp. n.

Figs 6, 7, 40

Etymology: Named after the unusual form of the male S7.

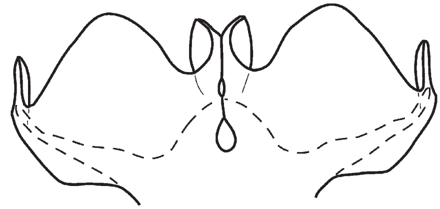
Diagnosis: Among the species with a normal scopa the following combination of characters is unique for the female: width of apical tergal hair bands about 1/2 width of scutellum, scutellum without black hairs, short malar area (less than half as long as width of mandibular base). Male can be most easily identified by the unique shape of S7 (Fig. 6).

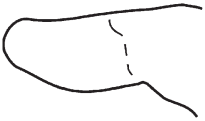
Description:

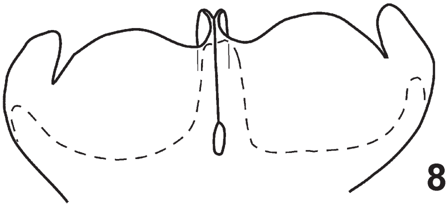
Female.

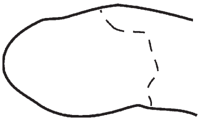
Length 12–13 mm.

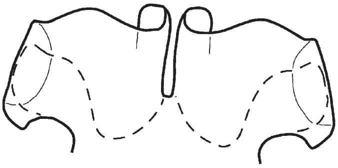
Vestiture: Face greyish to yellowish white with dark brown hairs intermixed especially along inner eye margins and on vertex; mesonotum with long yellowish white hairs intermixed with numerous longer, dark brown hairs; mesosomal sides and legs yellowish to orange-white, scutellum and metanotum with long brownish orange hairs; scopa dark brown dorsally and yellowish white ventrally; T1 densely covered with long, erect yellowish white hairs, medio-anteriorly with short, white hairs interspersed; disc of T2 with very short erect whitish hairs; discs of T3–T5 with successively longer, erect

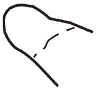

6

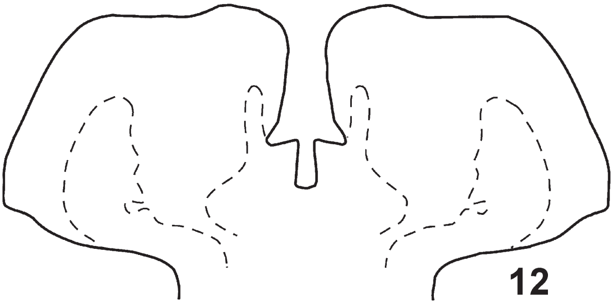

7

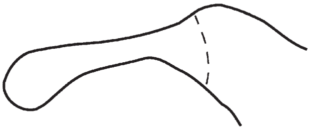

8

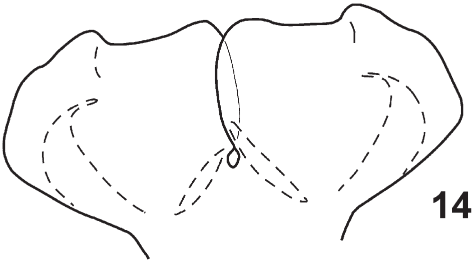

9

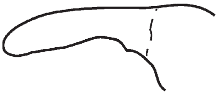

10

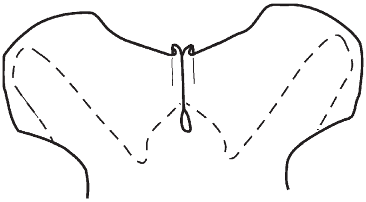

11

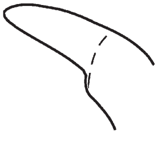

12


13


14


15


16


17

blackish hairs; broad, white posterior tergal hair bands on T1–T4, very narrow on T5; T2 with weak, narrow basal tomentum; S2–S5 with long, white hair fringes; discs of sterna densely covered with long, apically directed hairs.

Integument: Completely black, except tarsi often brownish and terga narrowly translucent posteriorly; T1–T3 with slight bluish shine; malar area narrow, length about 1/3 width of mandibular base; clypeus with dense (0.2 pd) medium-sized, slightly elongate punctures; integument between punctures smooth and shiny; facial fovea narrow, maximum width about 2/3 antenna diameter; disc of mesonotum without punctation, glabrous, surrounded by dense (< 0.5 pd) punctation; upper sloping part of propodeal triangle with short, longitudinal carinae anteriorly, scabriculous posteriorly, vertical part glabrous, anteriorly with short, weakly developed more or less transverse carinae; disc of T1 with shallow, fine and dense (0.5–1 pd) punctures, punctures much finer and denser on posterior tergal depression; disc of T2 with very fine and dense (< 0.5 pd) punctures; glabrous between punctures.

Male.

Length 11–12 mm.

Vestiture: Face greyish white intermixed with very few dark brown hairs along inner eye margins and vertex; mesonotum with long, yellowish white hairs intermixed with numerous longer, dark brown hairs; mesosomal sides and legs yellowish white, scutellum and metanotum with long, yellowish brown hairs intermixed with few dark brown hairs; T1 densely covered with long, erect, greyish white hairs; disc of T2 similar to T1 but with shorter hairs and a few depressed, long, white hairs medially; discs of T3–T6 with long, erect, blackish hairs; moderately broad, white, posterior tergal hair bands on T1–T5; S1–S5 with dense, very long fringes, longer laterally than medially.

Integument: Completely black, except tarsi often yellowish brown and terga posteriorly narrowly translucent; T1–T3 with slight bluish shine; malar area narrow, length about 1/2 width of mandibular base; clypeus with very dense small punctures (< 0.2 pd); facial fovea narrow, maximum width about 3/4 antenna diameter; disc of mesonotum with dense (1 pd), medium-sized punctures, surrounded by dense (< 0.2 pd) punctation, integument between punctures glabrous; upper sloping part of propodeal triangle with short, longitudinal carinae anteriorly, scabriculous posteriorly, vertical part smooth and shiny, anteriorly with 2 or 3 more or less transverse carinae; discs of T1 and T2 with distinct, fine, dense (< 0.5 pd) punctation, punctures becoming much finer and indistinctly shallow towards posterior tergal depression; integument between punctures smooth and shiny. Shape of S7 as in Fig. 6 and shape of gonostylus as in Fig. 7.

Holotype: ♂ SOUTH AFRICA: *Western Cape*: Citrusdal, 8.ix.1966, C.D. Michener (SEMC).

Paratypes: SOUTH AFRICA: *Northern Cape*: 1♂ road to Hondeklipbaai, 9.viii.1991, K. Steiner, on *Trachyandra* sp. (SAMC); *Western Cape*: 3♂ 4♀ same data as holotype (SEMC, CMK); 1♀ Klein Alexandershoek to Het Kruis, 26.ix.1985, F.W. & S.K. Gess (CMK); 9♂ 4♀ Biedouw Valley, 5–7.ix.1987, C.D. Eardley (SANC, CMK); 1♂ Seven Weeks Poort, 10.ix.1985, V.B. Whitehead (SAMC); 1♀ Atlantis, 16.ix.1985, V.B. Whitehead (SAMC); 2♂ Clanwilliam, 8.ix.1966, M. & C.D. Michener (SEMC).

Figs 6–17. Shapes of male S7 and gonostylus: (6, 7) *Colletes abnormis* sp. n.; (8, 9) *C. inornatus*; (10, 11) *C. genalis*; (12, 13) *C. bokkeveldi* sp. n.; (14, 15) *C. gessi* sp. n.; (16, 17) *C. testaceipes*. Scale bar = 0.5 mm.

Distribution: Known from different locations of the winter rainfall area. Eastwards to Seven Weeks Poort (Fig. 40).

Flower visiting: *Trachyandra* sp. (Asphodelaceae).

Phenology: First record 9th August, last record 26th September.

Remarks: This species is treated as *Colletes* sp. A in Kuhlmann (2006).

Colletes albohirtus Cockerell, 1946

Figs 1, 18, 19, 40

Colletes albohirtus: Cockerell 1945 (1946): 838. Type locality: South Africa, Matjesfontein.
Colletes montacuti Cockerell, 1946 (1947): 200–201. Type locality: South Africa, Montagu. **Syn. n.**

Diagnosis: Among the species with reduced scopae the female of *C. albohirtus* has the combination of legs completely red and metanotum with short plumose hairs medially (cf. Fig. 5). Male is best identified by the unique shape of S7 (Fig. 18).

Description:

Female.

Length 12–13 mm.

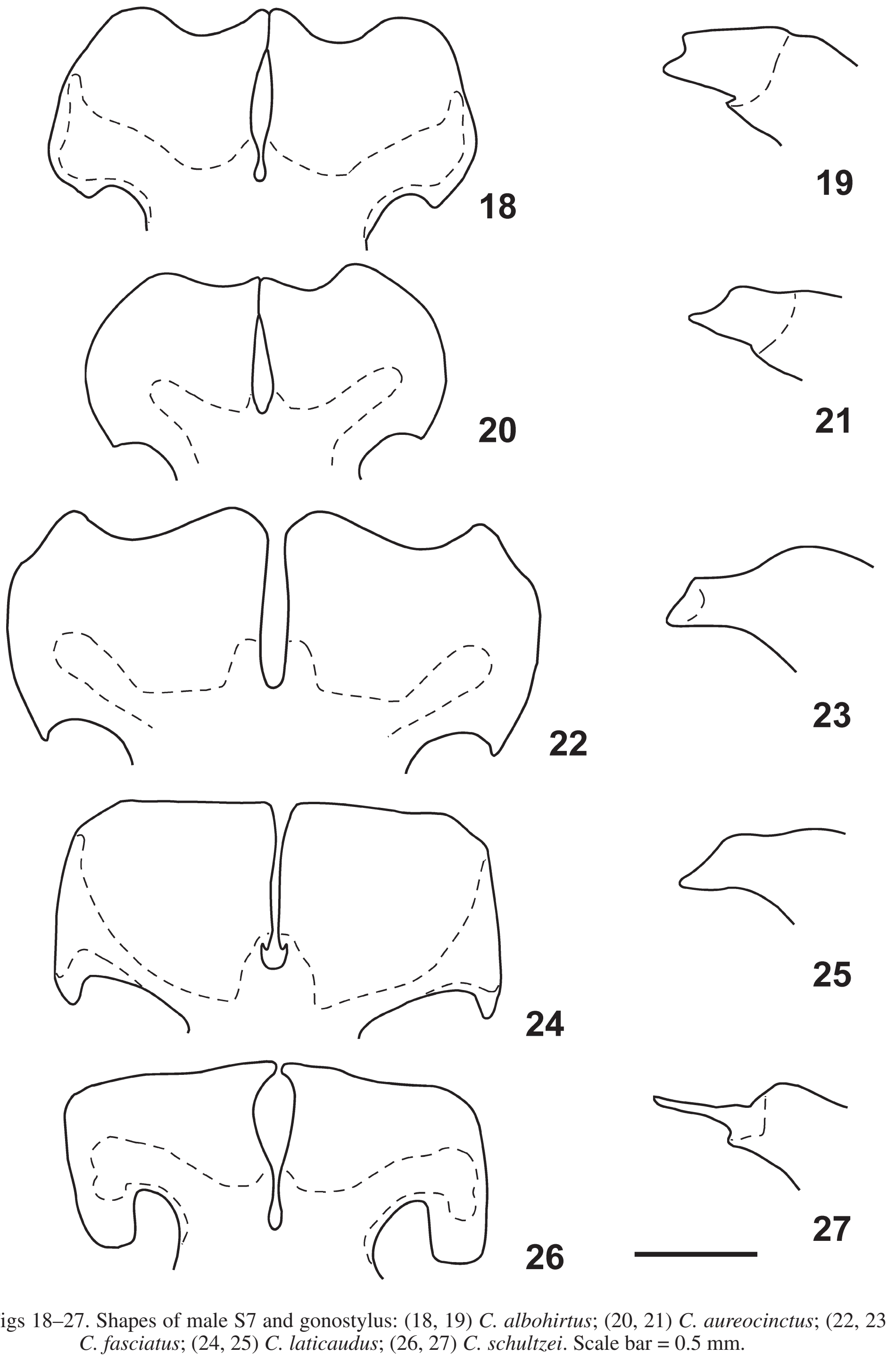
Vestiture: Face short, greyish white with long, dark brown hairs on vertex; mesonotum with short, yellowish brown hairs intermixed with numerous longer, blackish hairs; mesosomal sides with longer and legs with shorter, white to yellowish white hairs, scutellum and metanotum with short and medially plumose, brownish orange hairs, intermixed with longer, blackish hairs on scutellum; T1 densely covered with moderately long, erect, white hairs, shorter posteriorly; disc of T2 with very short, erect, whitish hairs; discs of T3–T5 with successively longer, erect, blackish hairs; narrow white posterior tergal hair bands on T1–T4, that on T1 narrowed medially, that on T5 very narrow; T2 with sparse very narrow basal tomentum; S2–S3 with very short, sparse white fringes, those on S4–S5 even less developed; discs of sterna loosely covered with very short hairs.

Integument: Mainly black, antenna brown ventrally, legs red and posterior margins of terga narrowly translucent reddish brown; T1–T3 with very slight bluish shine; malar area narrow, length about 1/3 width of mandibular base; clypeus slightly depressed medially, with dense (0.2 pd) small punctures that are slightly elongate; integument between punctures smooth and shiny; facial fovea broad, maximum width about 3× antennal diameter; disc of mesonotum with relatively loose (1 pd), coarse punctation, surrounded by dense (< 0.5 pd) punctation, integument between punctures glabrous; upper sloping part of propodeal triangle and anterior part of vertical area scabriculous, posterior vertical part glabrous; disc of T1 with distinct, relatively coarse, dense (0.5 pd) punctation, punctures becoming much finer and shallow towards posterior tergal depression; disc of T2 with fine, dense (< 0.5 pd) punctation; integument between punctures glabrous.

Male.

Length 11–13 mm.

Vestiture: Face white; mesonotum with long, white to greyish white hairs; mesosomal sides and legs white to greyish white, scutellum and metanotum with long yellowish to



Figs 18–27. Shapes of male S7 and gonostylus: (18, 19) *C. albohirtus*; (20, 21) *C. aureocinctus*; (22, 23) *C. fasciatus*; (24, 25) *C. laticaudus*; (26, 27) *C. schultzei*. Scale bar = 0.5 mm.

yellowish white hairs; T1 densely covered with long, erect greyish white hairs; disc of T2 with shorter hairs of same colour as T1; discs of T3–T6 with long, erect, blackish hairs, and narrow, white posterior tergal hair bands on T1–T4, that on T5 very narrow; S1–S5 with dense, long fringes, laterally longer than medially.

Integument: Completely black, except antenna brown ventrally, tarsi often brown and terga narrowly translucent posteriorly; T1–T5 with slight bluish shine; malar area narrow, length about 1/2 width of mandibular base; clypeus with very dense, small punctures (< 0.2 pd); facial fovea narrow, maximum width about antennal diameter; disc of mesonotum with medium-sized, scattered punctures (1 pd), integument smooth and shiny, surrounded by dense (< 0.2 pd) punctation; upper sloping part of propodeal triangle with short, longitudinal carinae anteriorly, scabriculous posteriorly, vertical part glabrous, upper half with 3–5 more or less transverse carinae; hind basitarsus modified, slightly curved and broadened apically with prominent long reddish bristles on dorsal apex; discs of T1 and T2 with fairly coarse distinct, dense (< 0.2 pd) punctation, punctures becoming slightly finer and more shallow towards posterior tergal depression; integument between punctures glabrous. Shape of S7 as in Fig. 18 and shape of gonostylus as in Fig. 19.

Type material examined: *Colletes albohirtus*, ♂ holotype: 'B.M. Type Hym. 17.a.1418, *Colletes albohirtus* Ckll. Type, S. Africa. R.E. Turner. Brit. Mus. 1928-542, Cape Province: Matjesfontein. 14–27.xi.1928' (BMNH).

Colletes montacuti, ♀ holotype: 'B.M. Type Hym. 17.a.1435, *Colletes montacuti* Ckll. Type, S. Africa. R.E. Turner, Brit. Mus. 1924-466, Cape Province, Montagu, 1–21.Oct. 1924' (BMNH).

Additional material examined: 63♀ 20♂. SOUTH AFRICA: *Northern Cape*: 3♀ Hester Malan Nat. Res., 30.ix.1986, M. Struck, on *Ruschia cymosa* (SANC); 1♀ 3.x.1987, 2♀ 30.ix.1985, idem; 1♀ Hester Malan Nat. Res., 5.ix.1985, M. Struck, on *Leipoldtia schultzei* (SANC); 2♀ 14.ix.1985, idem; *Western Cape*: 1♀ Worcester, 300 m, 8.x.1966, C.D. Michener (SEMC); 1♂ Worcester, 30.ix.1966, C.D. Michener (SEMC); 1♀ Ceres, Verlorenvlei, 9.xii.1990, C.D. Eardley (SANC); 6♀ Matroosberg Station, xii.1962 (SAMC); 2♂ Robertson, 300 m, 9.x.1966, C.D. Michener (SEMC, CMK); 2♂ Struisbay, 15 km NW, 27.ix.2001, B. Danforth (CUIC, CMK); 1♀ Elim, Touws Rivier to Verkeerdevlei, 4.xii.1986, F.W. Gess, on white mesem (AMGS); 1♀ Ouberg Pass, by road 31 km NE of Montagu, 3.xii.1986, F.W. Gess (AMGS); 1♀ Touws Rivier, half way to Hotnotskloof, xii.1962 (SAMC); 9♀ Montagu, 27 mi. E, 13.xi.1966, J.G. Rozen & C.D. Michener (AMNH, SEMC, CMK); 1♂ Ladismith, 26.ix.1948, C. Jacot-Guillarmod (AMGS); 1♂ 28.ix.1948, (CMK), 2♀ 14.ix.1948, (CMK) idem; 18♀ Barrydale, 48 mi. E, 13.xi.1966, J.G. Rozen & C.D. Michener (AMNH, SEMC, CMK); 1♂ Meirings Poort, x.1937 (SAMC); 9♀ 3♂ Uniondale, 16.xi.1966, J.G. Rozen & C.D. Michener (AMNH, SEMC, CMK); 1♀ Riviersonderend, Greyton, 21.x.1999, M. Halada (CMK); 5♂ Worcester, 19.x.1982, T.L. & T.R. Griswold (BLCU); 3♀ 2♂ De Doorns, 19.x.1982, T.L. & T.R. Griswold (BLCU); *Eastern Cape*: 2♂ Algoa Bay, 1.ix.1896, Dr Brauns (TMSA); 1♀ Wolwekraal, 33 km E Steytlerville, 860 m, 17.xi.1999, M.E. Irwin, E.I. Schlinger & F.D. Parker (BLCU).

Distribution: Widely recorded from the western South Africa, eastwards to near Port Elizabeth and northwards to Springbok (Fig. 40).

Flower visiting: *Leipoldtia schultzei*, *Ruschia cymosa* (Aizoaceae).

Phenology: First record 1st September, last record 9th December.

Colletes aureocinctus Cockerell, 1946

Figs 20, 21, 40

Colletes aureocinctus: Cockerell 1945 (1946): 840. Type locality: South Africa, Matjesfontein.

Diagnosis: The very broad and conspicuous orange posterior tergal hair bands on the female are similar to *C. fasciatus* and *C. latefasciatus*, but it differs in having broadly translucent apical tergal depressions on T1–T3 and narrow red margins on posterior part of discs. The male is best identified by the unique shape of S7 (Fig. 20).

Description:

Female.

Length 13–14 mm.

Vestiture: Face white to greyish white with blackish hairs intermixed on inner eye margins and vertex; mesonotum with short, yellowish white hairs intermixed with numerous longer, blackish hairs; mesosomal sides and legs yellowish to greyish white, scutellum and metanotum with long, yellowish brown hairs intermixed with longer blackish hairs; scopa dark brown dorsally and yellowish white ventrally; T1 loosely covered with short, erect, yellowish white hairs; disc of T2 with few very short, whitish hairs; discs of T3–T5 with successively longer, erect, blackish hairs; T1–T4 with very broad, orange, posterior tergal hair bands comprising very fine, dense pilosity, narrower on T5; T2 with well developed yellowish basal tomentum; S2–S5 laterally with short, loose, white hair fringes.

Integument: Completely black, except antenna brown ventrally, tarsi often brownish and terga broadly translucent posteriorly and narrow red margins on posterior parts of discs of T1–T3, less developed on T4; T1 with slight bluish shine; malar area elongate, length about 3/4 width of mandibular base; clypeus with dense (0.2 pd) medium-sized punctures that are strongly elongate forming long, more or less U-shaped carinae on lower part of the clypeus; integument between punctures very slightly shagreened and shiny; facial fovea narrow, maximum width about 2/3 antennal diameter; disc of mesonotum without punctation or with very few, coarse punctures, integument glabrous, surrounded by dense (< 0.5 pd) punctation; upper sloping part of propodeal triangle with short longitudinal carinae, vertical part superficially shagreened and slightly dull; disc of T1 with shallow, fine, relatively dense (1–2 pd) punctation, punctures becoming much finer (but a bit more distinct) and denser on posterior tergal depression; disc of T2 with very fine, dense (< 0.5 pd) punctation; integument between punctures glabrous.

Male.

Length 10–13 mm.

Vestiture: Face greyish white to white; mesonotum with long, greyish white to white hairs; mesosomal sides and legs white, scutellum and metanotum with long yellowish white hairs; T1 densely covered with long, erect, greyish white hairs; disc of T2 and T3 with successively hairs shorter but same colour as T1; discs of T4 with white and black and T5–T6 with long, erect, blackish hairs; narrow white posterior tergal hair bands on T1–T5; S1–S5 with dense, long fringes, laterally longer than medially.

Integument: Completely black except tarsi often reddish brown, terga posteriorly narrowly translucent; T1–T3 with very slight bluish shine; malar area long, about as long as width of mandibular base; clypeus with very dense, small punctures (< 0.2 pd); facial fovea narrow, maximum width about 1/2 antennal diameter; disc of mesonotum with medium-sized, scattered punctures (1–2 pd), glabrous, surrounded by dense (< 0.2 pd) punctation; upper sloping part of propodeal triangle with short, longitudinal carinae anteriorly, vertical part glabrous; hind basitarsus modified, sightly curved and weakly broadened apically, with prominent long reddish bristles on dorsal apical edge; discs of T1 and T2 with distinct fairly coarse, dense (< 0.5 pd) punctation, punctures becoming slightly finer and indistinctly shallow towards posterior tergal depression; integument between punctures glabrous. Shape of S7 as in Fig. 20 and shape of gonostylus as in Fig. 21.

Type material examined: *Colletes aureocinctus*, ♀ lectotype: 'B.M. Type Hym. 17.a.1413, *Colletes aureocinctus* Ckll. Type, Cape Province: Matjesfontein, 6–15.x.1928, S. Africa. R.E. Turner. Brit. Mus. 1928-480' (BMNH).

Additional material examined: 20♀ 1♂. SOUTH AFRICA: *Northern Cape*: 1♀ Karkams, 8 km E, 10.viii.1985, V.B. Whitehead, on Asteracae (SAMC); 2♀ Goegap Nat. Res., 8–10.ix.1992, F.W. & S.K. Gess, on *Ruschia* sp. (AMGS, CMK); 1♀ Hester Malan Nat. Res., 30.ix.1986, M. Struck, on *Ruschia cymosa* (SANC); 1♀ 19.ix.1985, 1♀ 25.ix.1986, 1♀ 3.x.1987, idem; 2♀ 1♂ Rooiwaal, Paulshoek, 7.x.2001, C. Mayer (CMK); 1♀ Remhoogte, Paulshoek, 31.viii.2003, C. Mayer (CCM); 1♀ Nieuwoudtville, Wild Flower Reserve, 21.vii.1986, V.B. Whitehead, on *Othonna* sp. (SAMC); *Western Cape*: 5♀ Worcester, 8.x.1966, C.D. Michener (SEMC, CMK); 1♀ Worcester, 30.ix.1966, C.D. Michener (CMK); 2♀ Vanrhynsdorp, 20 km N, 211 m, 21.ix.2001, B. Danforth (CUIC, CMK); 1♀ Vanrhynsdorp, 30 km N, 146 m, 22.viii.2003, K. Timmermann (CMK).

Distribution: Recorded from the entire winter rainfall area of South Africa, from northern Namaqualand south to the southern Cape region (Fig. 40).

Flower visiting: *Ruschia cymosa*, *Ruschia* sp. (Aizoaceae), *Othonna* sp. (Asteraceae).

Phenology: First record 21st July, last record 15th October.

Colletes bokkeveldi sp. n.

Figs 12, 13, 40

Etymology: Named after the Bokkeveld Plateau around Nieuwoudtville.

Diagnosis: Male is best identified by the unique shape of S7 (Fig. 12).

Description:

Male.

Length 11–12 mm.

Vestiture: Face greyish white to white with black hairs intermixed along inner eye margins and on vertex; mesonotum with long greyish white to white hairs, with numerous longer black hairs; mesosomal sides and legs white, scutellum and metanotum with long, yellowish white hairs intermixed with few black hairs; T1 densely covered with long, erect greyish white hairs, disc of T2 with shorter, concolorous hairs; discs of T3–T6 with long, erect, blackish hairs; narrow, white posterior tergal hair bands on T1–T5, very narrow on T6; S1–S5 with dense, relatively short, fringes, laterally longer than medially; S6 antero-laterally with an elongate brush of dense, short, red bristles.

Integument: Completely black, except tarsi reddish to yellowish brown and terga narrowly translucent posteriorly; malar area short, about 1/2 as long as width of mandibular base; clypeus with very dense, small punctures (< 0.2 pd); facial fovea narrow, maximum width about antennal diameter; disc of mesonotum medium-sized, relatively dense punctation (0.5–1 pd), integument between punctures glabrous, surrounded by dense (< 0.5 pd) punctation; upper sloping part of propodeal triangle with short, longitudinal carinae anteriorly, posteriorly and upper vertical part with irregular transversal carinae, integument between carinae and lower parts superficially shagreened; mid femora broadest near base, forming a right-angled edge with a sharp ridge ventrally; basitarsus of hindleg modified, sightly curved, a bit broadened apically with prominent long, reddish bristles on dorsal apical edge; discs of T1 and T2 with fine shallow, dense (0.5–1 pd) punctation, punctures becoming slightly finer and indistinctly shallow on posterior tergal depression; integument between punctures glabrous; shape of S7 as in Fig. 12 and shape of gonostylus as in Fig. 13.

Female. Unknown.

Holotype: ♂ SOUTH AFRICA: *Northern Cape*: Nieuwoudtville, Wild Flower Reserve, 21.vii.1986, Whitehead, on *Othonna* sp. (SANC).

Paratype: 1♂ SOUTH AFRICA: *Northern Cape*: Nieuwoudtville, Wild Flower Reserve, 4.viii.1988, V.B. Whitehead, on *Arctotheca calendula* (CMK).

Distribution: Only known from Nieuwoudtville in the Northern Cape (Fig. 40).

Flower visiting: *Arctotheca calendula*, *Othonna* sp. (Asteraceae).

Phenology: First record 21st July, last record 4th August.

Colletes cardiurus Cockerell, 1946

Fig. 40

Colletes cardiurus: Cockerell 1945 (1946): 839. Type locality: South Africa, Matjesfontein.

Diagnosis: Among the species with a normal scopa the following combination of characters is unique in the female: small size with elongate malar area (malar area about as long as width of mandibular base) and narrow, poorly developed posterior tergal hair bands.

Description:

Female.

Length 10 mm.

Vestiture: Face white to greyish white with blackish brown hairs intermixed on vertex; mesonotum with short, yellowish to greyish white hairs intermixed with numerous longer blackish hairs; mesosomal sides and legs yellowish to greyish white, scutellum and metanotum with short, yellowish brown hairs intermixed with longer blackish hairs; scopa dark brown dorsally and yellowish ventrally; hind basitarsus with very long, dark brown bristles dorsally; T1 loosely covered with long, erect yellowish white to white hairs; disc of T2 with few, very fine, whitish hairs; discs of T3–T5 with successively longer, short, erect, blackish hairs; very narrow white posterior tergal hair bands occur on T1–T3, even narrower on T4; T2 without basal tomentum; S2–S5 with long, scattered, brownish hairs.

Integument: Completely black, except tarsi and ends of tibiae reddish brownish; terga posteriorly slightly translucent, dark reddish brown; malar area elongate, length about width of mandibular base; clypeus with dense (0.2 pd), fine punctation, punctures elongate; integument between punctures glabrous; facial fovea slightly broadened, maximum width about 1–1.2× antennal diameter; disc of mesonotum with scattered (2–3 pd), relatively coarse punctation, integument glabrous, surrounded by dense (< 0.5 pd) punctation; upper sloping part of propodeal triangle with short longitudinal carinae, vertical part superficially shagreened and slightly dull; disc of T1 with indistinct, shallow, fine and scattered (2–3 pd) punctures, punctures becoming finer (but a bit more distinct) and denser towards posterior tergal depression; disc of T2 with very fine, but more distinct and dense (0.5–1 pd), punctation; integument between punctures glabrous.

Male. Unknown.

Type material examined: *Colletes cardiurus*, ♀ holotype: 'B.M. Type Hym. 17.a.1420, *Colletes cardiurus* Ckll. Type, Cape Province, Matjesfontein, 6–15.x.1928, S. Africa. R.E. Turner. Brit. Mus. 1928-480' (BMNH).

Additional material examined: 2♀. NAMIBIA: 1♀ Klinghart Mts, 5.x.1980, V.B. Whitehead (CMK). SOUTH AFRICA: 1♀. *Northern Cape*: Port Nolloth, 40 km N, 11.ix.2001, B. Danforth (CMK).

Distribution: Only known from three locations in the winter rainfall area from south-western Namibia to the Cape region (Fig. 40).

Flower visiting: Unknown.

Phenology: First record 11th September, last record 15th October.

Colletes cyanonitidus sp. n.

Figs 5, 30, 31, 40

Etymology: Named for the characteristic bluish shine on the terga.

Diagnosis: Among the species with a reduced scopa *C. cyanonitidus* is unique in that it has an intense bluish shine on T1 and T2 (this is less intense in the very similar *C. obscurus*) and the short plumose hairs on the scutellum and metanotum (Fig. 5) (this is less developed in *C. obscurus*). The male is best identified by the unique shape of the S7 (Fig. 30) and the narrow, very elongate, 2nd hind tarsomere. This trait *C. cyanonitidus* shares only with a male of an undescribed species.

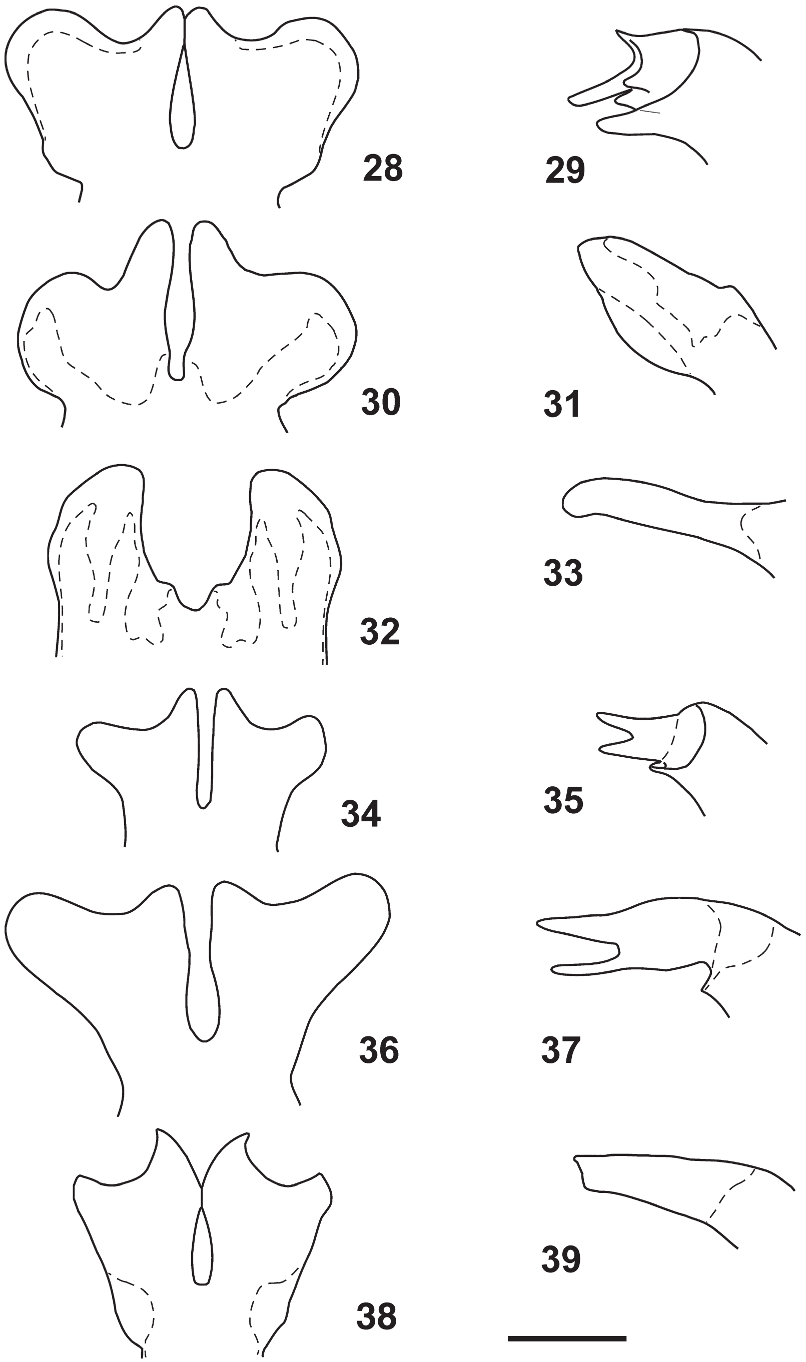
Description:

Female.

Length 10–11 mm.

Vestiture: Face short greyish white with long dark brown hairs on vertex; mesonotum with short yellowish brown hairs intermixed with numerous longer blackish hairs; mesosomal sides with longer and legs with white to yellowish white hairs that are shorter than face, scutellum and metanotum with short and medially plumose brownish orange hairs (Fig. 5), scutellum intermixed with longer, blackish hairs; T1 very sparsely covered with moderately long, erect, white hairs, shorter posteriorly; disc of T2 sparsely covered with very short, depressed, whitish hairs; discs of T3–T5 with successively longer, erect, blackish hairs; moderately broad white posterior tergal hair bands on T1–T4, slightly narrowed medially on T1, very narrow on T5; T2 with weak and very narrow basal tomentum medially; S2–S4 with very short and indistinct white hair fringes laterally; discs of sterna very sparsely covered with very short hairs.

Integument: Mainly black, antenna brown ventrally, legs and tarsi partly with a reddish shine and terga posteriorly very narrowly translucent reddish brown; T1–T3 with bluish shine, more intense on T1; malar area narrow, length about 1/2 width of mandibular base; clypeus slightly depressed medially, with dense (0.2–0.5 pd), small punctures that are slightly elongate; integument between punctures glabrous; facial fovea narrow, maximum width about antennal diameter; disc of mesonotum with relatively dense (0.5–1 pd), fine punctation, surrounded by dense (< 0.5 pd) punctation, integument between punctures glabrous; upper sloping part of propodeal triangle with short longitudinal carinae, vertical part distinctly shagreened and dull; disc of T1 with very fine, indistinct, sparse (1–2 pd) punctation, punctures becoming slightly finer and less



Figs 28–39. Shapes of male S7 and gonostylus: (28, 29) *C. knersvlaktei* sp. n.; (30, 31) *C. cyanonitidus* sp. n.; (32, 33) *C. nieuwoudtvillei* sp. n.; (34, 35) *C. katharinae* sp. n.; (36, 37) *C. denudatus*; (38, 39) *C. karooensis* sp. n. Scale bar = 0.5 mm.

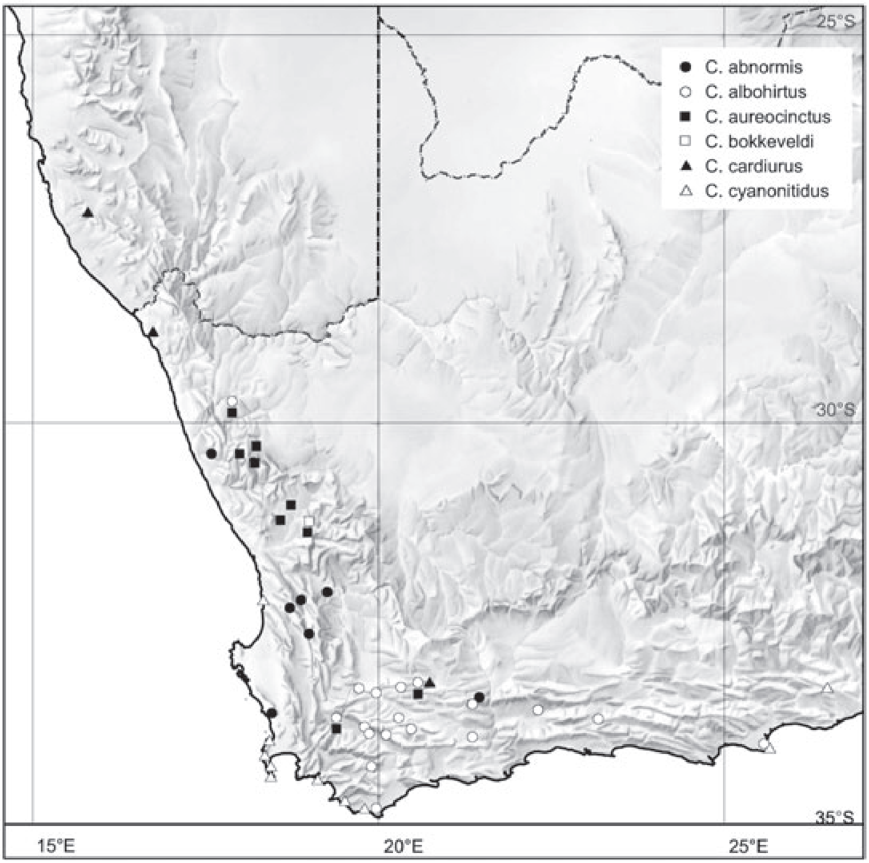


Fig. 40. Distribution of *C. abnormis*, *C. albohirtus*, *C. aureocinctus*, *C. bokkeveldi*, *C. cardiurus* and *C. cyanonitidus*.

distinct towards posterior tergal depression; punctation on disc of T2 similar but dense (0.5–1 pd); integument between punctures glabrous.

Male.

Length 9–10 mm.

Vestiture: Face white; mesonotum with long, yellowish white hairs; mesosomal sides and legs white to yellowish white, scutellum and metanotum with long yellowish to yellowish brown hairs, scutellum intermixed with few brown hairs; T1 densely covered with long, erect, greyish white hairs; disc of T2 with shorter hairs of same colour as T1; discs of T3–T6 with long, erect, blackish hairs; narrow and indistinct white posterior tergal hair bands on T1–T4, very narrow on T5; S1–S5 with short, dense fringes, laterally longer than medially; S6 laterally with a patch of short, very dense velvet-like hairs.

Integument: Completely black, except antenna dark brown ventrally, tarsi often brown and terga narrowly translucent posteriorly; T1–T5 with relatively intense bluish shine; malar area long, length about 3/4 width of mandibular base; clypeus with very dense (< 0.2 pd) small punctures; facial fovea narrow, maximum width about 3/4 antennal diameter; disc of mesonotum with relatively small, scattered punctures (1 pd), integument glabrous, surrounded by dense (< 0.2 pd) punctation; upper sloping part of propodeal triangle with short, longitudinal carinae, vertical part distinctly shagreened with some weakly developed more or less transverse carinae; hind femora ventrally swollen with a rounded edge medially that is covered with a brush of hairs; basitarsus of hind leg modified, slightly convex apically, with a prominent rounded tip dorsally that is apically beset with long, reddish bristles; basitarsus ventrally densely covered with long, reddish bristles; discs of T1 and T2 with relatively densely granular (0.5–1 pd) punctation, granulation becoming slightly finer and indistinct towards posterior tergal depression; integument between punctures glabrous. Shape of S7 as in Fig. 30 and shape of gonostylus as in Fig. 31.

Holotype: ♂ SOUTH AFRICA: *Eastern Cape*: Grahamstown, ix.1915, J. Hepburn (AMGS).

Paratypes: SOUTH AFRICA: *Western Cape*: 2♀ Kommetjie, 13.x.1972, J.G. Rozen, R. McGinley, C. Thompson (AMNH); 5♀ 12.x.1972, (AMNH, CMK), idem; 1♀ Kommetjie, 6.xi.1968, J.G. Rozen, E. Martinez (AMNH); 1♂ Cape of Good Hope, 29.x.1966, C.D. Michener (SEMC); 1♂ same data as holotype (AMGS); 2♂ 1♀ Eland's Bay, Baboon Point, 26.ix.1978, V.B. Whitehead (SAMC); 2♂ Vermont Dune, 1.x.1978, V.B. Whitehead (SAMC, CMK); 2♂ Vermont, 10.x.1978, V.B. Whitehead (SAMC, CMK); 1♂ 3♀ Pearly Beach, Bredasdorp, ix.1959 (SAMC); 6♂ Blouberg Strand, 22.viii.1978, V.B. Whitehead, on *Carpobrotus sauerae* (SAMC, CMK); 2♂ Milnerton, ix. 1965, F. Gess (SAMC); 1♂ 2♀ Vermont, 8.x.1977, V.B. Whitehead, on pink *Carpobrotus edulis* (SAMC, CMK); 3♂ Onrus, 8.x.1977, V.B. Whitehead, on *Carpobrotus edulis* (SAMC); 1♂ 1♀ Vermont, 10.x.1977, V.B. Whitehead (SAMC); 1♀ Brandfontein Reserve, Strandveld, 16–18.x.1992, S. van Noort (SAMC); 1♀ Eland's Bay, 12.x.1979, V.B. Whitehead (SAMC); 1♂ Cape of Good Hope Nat. Res., Olifantbosbaai, 30.ix.2001 (CUIC); *Eastern Cape*: 1♂ Grahamstown, 9.viii.1958, D.H. Cumming (CMK); 1♂ Grahamstown, 30.viii.1964, D.J. Brothers (AMGS); 1♂ 2♀ Algoa Bay, 23.viii.1897, Dr Brauns (TMSA); 3♀ 30.viii.1896, idem.

Distribution: The species seems to have a strong preference for coastal sites of the southern Cape region (Fig. 40).

Flower visiting: *Carpobrotus edulis*, *C. sauerae* (= *C. quadrifidus*) (Aizoaceae).

Remarks: This species is treated as *Colletes* sp. B in Kuhlmann (2006).

Colletes denudatus Cockerell, 1946

Figs 36, 37, 41

Colletes denudatus: Cockerell 1945 (1946): 839. Type locality: South Africa, Matjesfontein.

Diagnosis: Male is best identified by the unique shape of S7 (Fig. 36) and gonostylus (Fig. 37).

Description:

Male.

Length 11–13 mm.

Vestiture: Face greyish white to white hairs; mesonotum with long, greyish white to white hairs; mesosomal sides and legs white, scutellum and metanotum with long, yellowish brown hairs, scutellum intermixed with few black hairs; base of hind femora with a dense row of white, erect hairs, all of equal length more or less along longitudinal axis; T1 densely covered with long, erect yellowish white hairs; disc of T2 with shorter, concolorous hairs; discs of T3–T6 with long, erect, blackish hairs; T1–T5 with narrow, very sparse, white posterior tergal hair bands; T2–T5 laterally with few, very long, erect hairs; S1–S5 with loose fringes of moderately long hairs laterally, not longer than medially, discs with moderately long, erect, white hairs; S6 with a very small, elongate brush of dense short white bristles basolaterally, medially with long, curved hairs towards the median line.

Integument: Completely black, except tarsi reddish brown and terga narrowly translucent posteriorly; malar area short, about 3/4 as long as width of mandibular base; clypeus with very dense, small punctures (< 0.2 pd); facial fovea narrow, maximum width about antennal diameter; disc of mesonotum medium-sized, relatively densely punctate (0.5–1 pd), integument between punctures glabrous, surrounded by slightly denser punctation; upper sloping part of propodeal triangle with short, longitudinal carinae, vertical part densely shagreened and relatively dull; basitarsus of hindleg modified, with a slight longitudinal bend and broadened apically, with prominent, long, reddish bristles on dorso-apical edge; basitarsus ventrally with long, orange bristles apically; integument of T1–T2 dull, with relative coarse, dense (< 0.5 pd) punctation, largely absent on nearly glabrous posterior tergal depression. Shape of S7 as in Fig. 36 and shape of gonostylus as in Fig. 37.

Female. Unknown.

Type material examined: *Colletes denudatus*, ♂ holotype: 'B.M. Type Hym. 17.a.1419, *Colletes denudatus* Ckll. Type, Cape Province; Matjesfontein, 6–15.x.1928, S. Africa. R.E. Turner. Brit. Mus. 1928-480' (BMNH).

Additional material examined: 5♂. SOUTH AFRICA: *Northern Cape*: 1♂ Hester Malan Nat. Res., 14.ix.1985, M. Struck, on *Leipoldtia schultzei* (SANC); 1♂ 5.ix.1985, idem; 1♂ Hester Malan Nat. Res., 30.ix.1985, M. Struck, on *Ruschia cymosa* (CMK); 1♂ Nieuwoudtville, Wild Flower Reserve, 27.vii.1986, V.B. Whitehead, on *Othonna* (SAMC); 1♂ 21.vii.1986, idem (CMK).

Distribution: Only recorded from three localities scattered over the entire winter rainfall area (Fig. 41).

Flower visiting: *Leipoldtia schultzei*, *Ruschia cymosa* (Aizoaceae), *Othonna* sp. (Asteraceae).

Phenology: First record 21st July, last record 15th October.

Colletes eardleyi sp. n.

Fig. 41

Etymology: Named for Connal Eardley, Pretoria, who greatly facilitated bee systematic work in southern Africa.

Diagnosis: Among the species with a reduced scopa the following combination of characters is unique: tibiae completely orange-brown to red and width of facial fovea about diameter of antennal flagellum.

Description:

Female.

Length 10–11 mm.

Vestiture: Face short, greyish white with long, dark brown hairs at vertex; mesonotum with short, yellowish brown hairs intermixed with numerous longer, blackish hairs; mesosomal sides with longer, and legs with shorter, white to yellowish white hairs, scutellum and metanotum with short, yellowish brown hairs, those on scutellum intermixed with longer, blackish hairs; T1 densely covered with moderately long, erect, white hairs, shorter posteriorly; disc of T2 with very short, erect, whitish hairs; discs of

T3–T5 with short, yet successively longer, erect, blackish hairs; relatively broad white posterior tergal hair bands on T1–T4, slightly narrowed medially on T1, and very narrow on T5; T2 with very weakly developed and very narrow basal tomentum; S2–S4 with very short, thin white hair fringes laterally; discs of sterna loosely covered with very short hairs.

Integument: Mainly black, antenna brown ventrally, legs red, except trochanter and basal parts of femora, terga narrow and indistinctly translucent reddish brown posteriorly, discs of T2–T5 sometimes with a narrow transverse red stripe posteriorly; T1–T3 with slight bluish shine; malar area long, length about 3/4 width of mandibular base; clypeus convex medially, with dense (0.2 pd) small punctures that only very slightly elongate; integument between punctures glabrous; facial fovea narrow, maximum width about 3/4 antennal diameter; disc of mesonotum with relatively sparse (1 pd), coarse punctation, surrounded by dense (< 0.5 pd) punctation, integument between punctures glabrous; upper sloping part of propodeal triangle with short, longitudinal carinae, vertical part superficially shagreened and shiny, anteriorly with 2–4 more or less transverse carinae; disc of T1 with distinct, fine, dense (0.5 pd) punctation, punctures becoming much denser, finer and shallow towards posterior tergal depression; disc of T2 with very fine, dense (< 0.5 pd) punctation; integument between punctures glabrous.

Male. Unknown.

Holotype: ♀ SOUTH AFRICA: *Western Cape*: Lamberts Bay, 4.x.1974, R. Watmough (SANC).

Paratypes: SOUTH AFRICA: *Western Cape*: 6♀ same data as holotype (SANC, CMK); 2♀ Remhoogte, plain, 6.x.2002, C. Mayer, on Aizoaceae, *Ruschia* sg. *Tumidula*, pink (CMK); 1♀ 14.x.2001, idem; 1♀ Vanrhynsdorp, 20 km N, 21.ix.2001, 211 m (CMK).

Distribution: Known from only three locations in Namaqualand (Fig. 41).

Flower visiting: *Ruschia* (*Tumidula*) sp. (Aizoaceae).

Phenology: First record 21st September, last record 14th October.

Remarks. This species is treated as *Colletes* sp. C in Kuhlmann (2006).

Colletes fasciatus Smith, 1853

Figs 22, 23, 41

Colletes fasciata: Smith 1853: 4. Type locality: South Africa, Cape.
Colletes hirsutissimus: Cockerell 1945 (1946): 837–838. Type locality: South Africa, Lion's Head, Cape Town.

Diagnosis: The very broad, conspicuous, orange posterior tergal hair bands of female are similar to *C. aureocinctus* and *C. latefasciatus*, but it differs from the former in lacking broadly translucent apical tergal depressions on T1–T3 with narrow red margins on posterior parts of discs, and from latter by orange-brown instead of yellowish brown posterior tergal hair bands. Male has a uniquely shaped S7 (Fig. 22).

Description:

Female.

Length 12–13 mm.

Vestiture: Face white to greyish white with blackish hairs intermixed on vertex; mesonotum with short, yellowish white hairs intermixed with numerous longer, blackish hairs;

mesosomal sides and legs yellowish to greyish white, scutellum and metanotum with short, yellowish brown hairs on scutellum, intermixed with longer, blackish hairs; scopa dark brown dorsally and yellowish brown ventrally; T1 relatively densely covered with short, erect, yellowish white hairs; disc of T2 very densely covered with very short yellowish brown hairs; discs of T3–T5 with successively longer, short, erect, blackish hairs; very broad orangish to orange-brown posterior tergal hair bands on T2–T4, on T1 and T5 they are a bit narrower and consist of very fine, dense pilosity; T2 without basal tomentum; S2 with thin fringe of longer yellowish white hairs, S3–S4 with shorter, less developed fringes laterally that comprise longer hairs medially, S5 covered with long, reddish hairs.

Integument: Completely black, except tarsi sometimes slightly brownish and T1 broadly translucent posteriorly; malar area short, length about 1/2 width of mandibular base; clypeus with dense (0.2 pd) medium-sized punctures that strongly elongate forming long, more or less U-shaped carinae on lower part of clypeus; integument between punctures glabrous; facial fovea very narrow, maximum width about 1/2 antennal diameter; disc of mesonotum with dense (0.5 pd), relatively coarse punctation, integument glabrous, surrounded by dense (< 0.5 pd) punctation; upper sloping part of propodeal triangle with short longitudinal carinae, vertical part superficially shagreened, slightly dull, anteriorly with 1–2 weakly developed largely transverse carinae; disc of T1 with distinct, fine, dense (0.5–1 pd) punctation, punctures becoming a bit finer, more shallow and denser towards posterior tergal depression; disc of T2 with very fine, dense (< 0.5 pd) punctation; integument between punctures glabrous.

Male.

Length 12–13 mm.

Vestiture: Face greyish white to white with interspersed brown hairs on vertex; mesonotum with long, greyish white to white hairs with few dark brown hairs on posterior margin; mesosomal sides and legs white, scutellum and metanotum with long, yellowish brown hairs on scutellum intermixed with dark brown hairs; T1 densely covered with long, erect, yellowish brown hairs; disc of T2 and T3 with successively shorter hairs, those on T2 concolorous, and on T3 darker brownish; T4–T6 with long, erect, blackish hairs; posterior tergal hair bands missing or very weakly developed; S2 emarginate posteriorly and with short, dense fringe, S3 with a triangular shaped patch of anteriorly directed, velveteen hairs, S4 with indistinct fringes.

Integument: Completely black, except tarsi sometimes slightly reddish brown, terga narrowly translucent posteriorly; malar area long, about as long as width of mandibular base; clypeus with very dense (< 0.2 pd) small punctures; facial fovea very narrow, maximum width about 1/2 antennal diameter; disc of mesonotum with medium-sized punctures, dense punctate (0.5–1 pd), integument glabrous, surrounded by dense punctation (< 0.2 pd); upper sloping part of propodeal triangle with short longitudinal carinae anteriorly, vertical part superficially shagreened and shiny; tibiae partly and femora entirely strongly swollen, hind basitarsus slightly curved and a bit broadened apically, with prominent long, reddish bristles on dorsal apical edge; discs of T1 and T2 with distinct fine and dense (0.5–1 pd) granulation, granulation absent on posterior tergal depression, integument indistinctly and superficially shagreened and shiny. S6

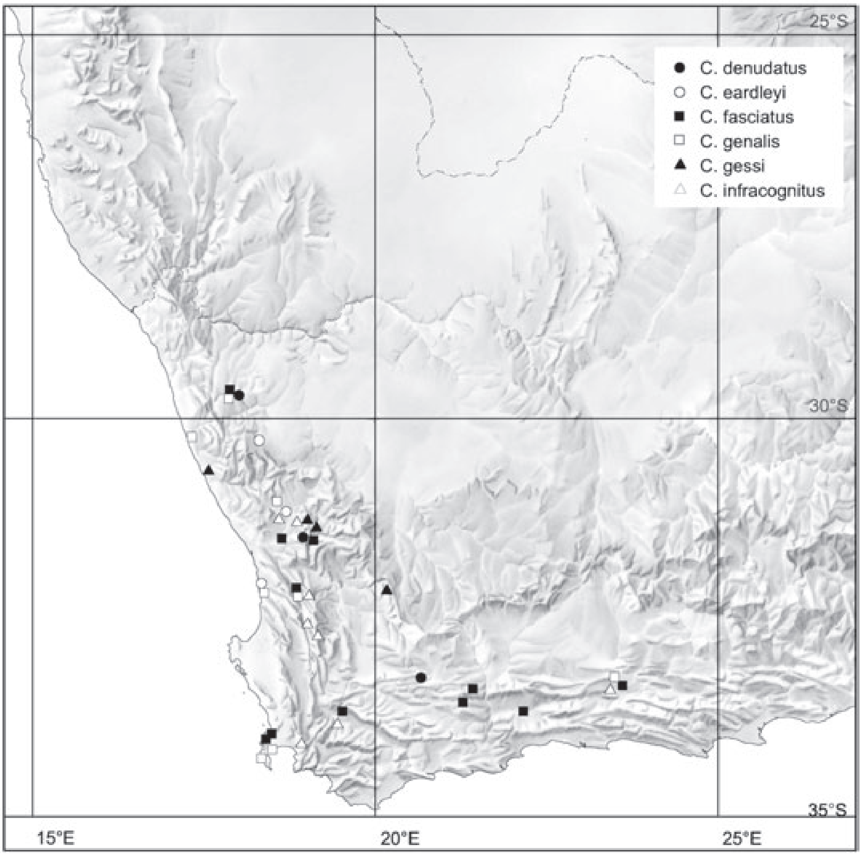


Fig. 41. Distribution of *C. denudatus*, *C. eardleyi*, *C. fasciatus*, *C. genalis*, *C. gessi* and *C. infracognitus*.

basolaterally with short, stout spine and a small tuft of short hairs at tip of spine; shape of S7 as in Fig. 22 and shape of gonostylus as in Fig. 23.

Type material examined: *Colletes fasciatus*, ♀ lectotype: 'B.M. Type Hym. 17.a.341, *Colletes fasciata* Sm. (Type), Cape, Sm. Coll. 79.22' (BMNH).

Colletes hirsutissimus, ♂ holotype: 'B.M. Type Hym. 17.a.1417, *Colletes hirsutissimus* Ckll. Type, S. Africa, R.E. Turner, 1920-342, Lion's Head, Cape Town. Aug. 1920' (BMNH).

Additional material examined: 13♀ 3♂. SOUTH AFRICA: *Northern Cape*: 1♀ Okiep, ix.1890 (SAMC); 2♂ Nieuwoudtville, Willemsrivier, 28.viii.1994, V.B. Whitehead (SAMC, CMK); *Western Cape*: 1♀ Vanrhynsdorp, 2 km N, 27.viii.1985, V.B. Whitehead, on pink mesem (SAMC); 1♀ Clanwilliam, 6.2 km S on the old Citrusdal road, 10.ix.1984, V.B. Whitehead, on pink mesem (CMK); 4♀ Worcester, 30.ix.1966, C.D. Michener (SEMC, CMK); 2♀ Worcester, 8.x.1966, C.D. Michener (SEMC, CMK); 1♀ Ladismith, 26.ix.1948, C. Jacot-Guillarmod (AMGS); 1♀ Ladismith, 24.ix.1948, C. Jacot-Guillarmod (AMGS); 1♂ Seven Weeks Poort, 10.ix.1948, C. Jacot-Guillarmod (CKM); 1♀ dam near Oudtshoorn, 10.x.1972, C. Jacot-Guillarmod, on *Pelargonium myrrhifolium* (AMGS); *Eastern Cape*: 1♀ Willowmore, 5.ix.1920, Dr Brauns (SAMC).

Distribution: Widespread, scattered records from northern Namaqualand (near Springbok) to the southern Cape (south-western Cape eastwards to Willowmore) (Fig. 41).

Flower visiting: Mesem (Aizoaceae), *Pelargonium myrrhifolium* (Geraniaceae).

Phenology: First record 27th August, last record 10th October.

Colletes genalis Friese, 1909

Figs 2, 10, 11, 41

Colletes genalis: Friese 1909: 122. Type locality: Namibia, Grotfontein [sic!].
Colletes genalis australis: Cockerell 1945 (1946): 841. Type locality: South Africa, Rapenburg, Cape Flats.

Diagnosis: Among species with a normal scopa, *C. genalis* is unique in the combination of its small size and very broad malar area (malar area about 1.5× as long as width of mandibular base). Male can be most easily identified by the unique shape of S7 (Fig. 10).

Description:

Female.

Length 9–10 mm.

Vestiture: Face greyish white with blackish brown hairs intermixed at inner eye margins, between antennae and on vertex; mesonotum with long, yellowish to greyish white hairs intermixed with numerous longer blackish hairs; mesosomal sides and legs yellowish to greyish white, with long black hairs on tibiae and tarsi, scutellum and metanotum with long, yellowish brown hairs, intermixed with longer blackish hairs on scutellum; scopa dark brown dorsally and yellowish ventrally; hind basitarsus with very long, dark brown bristles dorsally; T1 densely covered with long, erect, yellowish white to white hairs; disc of T2 with dense short whitish hairs; discs of T3–T5 with successively longer, erect, blackish hairs; narrow white posterior tergal hair bands on T1–T4, very narrow on T5; T2 with narrow basal tomentum; S2–S3 with very sparse short, fringes laterally, discs of sterna with scattered long, brownish hairs.

Integument: Completely black, except antennae brown ventrally, legs partly dark reddish brown; terga with very narrow, slightly translucent dark reddish brown area posteriorly; malar area elongate, length about 1.5× width of mandibular base; clypeus convex with dense (0.2 pd), fine punctation, punctures elongate; integument between punctures glabrous; facial fovea narrow, maximum width about 3/4 antennal diameter; disc of mesonotum with dense (0.5–1 pd), coarse punctation, integument glabrous, surrounded by dense (< 0.5 pd) punctation; upper sloping part of propodeal triangle scabriculous, vertical part shagreened and slightly dull; disc of T1 with indistinct, shallow, fine, scattered punctures (2–3 pd), punctures becoming denser and shallower towards posterior tergal depression; disc of T2 with very fine, but distinct, dense punctation (0.5–1 pd); integument between punctures glabrous.

Male.

Length 9–10 mm.

Vestiture: Face white with blackish brown hairs intermixed along inner eye margins and vertex; mesonotum with long, greyish white hairs; mesosomal sides and legs white to yellowish white, scutellum and metanotum with long, yellowish white hairs, scutellum intermixed with a few brown hairs; T1 densely covered with long, erect, yellowish brown hairs; disc of T2–T3 with successively shorter concolorous hairs; discs of T4–T6 with long, erect, blackish hairs; relatively broad and distinct white tergal hair bands posteriorly on T1–T5; S2–S5 with dense, but very short fringes; fringes longer laterally than medially; discs of sterna with long, erect, white hairs.

Integument: Completely black, except antenna yellowish to reddish brown ventrally, legs and tarsi partly dark reddish brown and terga posteriorly narrowly translucent; malar area long, length about 1.5× width of mandibular base; clypeus with very dense (< 0.2 pd), small punctures; facial fovea narrow, maximum width about 1/2 antennal diameter; disc of mesonotum with relatively small, scattered punctures (1 pd), integument glabrous, surrounded by dense (0.5 pd) punctation; upper sloping part of propodeal triangle with short longitudinal carinae, vertical part distinctly shagreened and dull with some well developed more or less transverse carinae; hind basitarsus not modified; discs of T1 and T2 with relatively dense granulation (1 pd), granulation becoming slightly finer and indistinct on posterior tergal depression; integument between punctures glabrous. Shape of S7 as in Fig. 10 and shape of gonostylus as in Fig. 11.

Type material examined: *Colletes genalis*, ♀ lectotype: 'SW. Afrika, Grotfontein, 1903, Volkmann, *Colletes genalis* 1908 Friese det., Type, Coll. Friese' (ZMHB).

Colletes genalis australis, ♀ holotype: 'B.M. Type Hym. 17.a.1437, *Colletes genalis australis* Ckll. Type, Rapenburg, Cape Flats, 1–14.x.1920, S. Africa. R.E. Turner. 1920-424' (BMNH).

Additional material examined: 14♀ 5♂. SOUTH AFRICA: *Northern Cape*: 1♀ Hondeklip Bay, 12.x.1994, F.W. & S.K. Gess (AMGS); 1♀ Hester Malan Nat. Res., 30.viii.1987, M. Struck (CMK); 2♂ 31.v.1985, (TMSA, CMK), idem; *Western Cape*: 1♀ Kommetjie, 13.x.1972, J.G. Rozen, R. McGinley & C. Thompson (AMNH); 1♂ Graafwater, 5 km W, 2.vi.1984, V.B. Whitehead (SAMC); 1♂ 21.iv.1984, idem (CMK); 1♀ Knersvlakte, 48 km N Vanrhynsdorp, 20.ix.1996, F.W. & S.K. Gess (CMK); 1♀ Clanwilliam, Ramskop Camp, 20.viii.1984, V.B. Whitehead, on mauve vygie (SAMC); 1♀ Clanwilliam, Nardouw, 1.ix.1941, Museum Staff (SAMC); *Eastern Cape*: 1♀ Willowmore, 17.ix.1902, Dr Brauns (TMSA); 1♀ 30.vi.1920, 1♀ 19.viii.1906, 1♀ 20.viii.1909, 1♀ 1.ix.1920, 1♂ 30.vii.1920, 1♀ 15.ix.1902, 1♀ 4.ix.1919 (CMK), 1♀ 17.ix.1902, idem (SAMC).

Distribution: From northern Namaqualand (near Springbok) through the entire winter rainfall area eastwards to Willowmore (Fig. 41). The isolated record from 'Grotfontein' (= Grootfontein, Namibia) is very probably an error caused by incorrect labelling and is not included in the distribution map.

Flower visiting: Vygie (Asteraceae).

Phenology: First record 21st April, last record 14th October.

Colletes gessi sp. n.

Figs 14, 15, 41

Etymology: Named for Dr Friedrich Gess, Grahamstown, who greatly facilitated this study by providing numerous specimens collected over the last decades by him and his wife Sarah.

Diagnosis: Female readily identifiable by the characters given in the key. Among the species with a normal scopa it is unique by the smaller and less convex clypeus. Male best identified by the unique shape of S7 (Fig. 14).

Description:

Female.

Length 11–12 mm.

Vestiture: Face greyish to yellowish brown with numerous blackish hairs intermixed, densely along inner eye margins, between antennae and on vertex; mesonotum with relatively long, dark greyish hairs intermixed with numerous longer blackish hairs; mesosomal sides and legs yellowish to greyish white, with numerous black hairs on legs, scutellum and metanotum with orange-brown hairs, scutellum with longer blackish hairs intermixed; scopa dark blackish dorsally and yellow ventrally; T1 very densely covered with very long, erect, yellowish brown hairs; disc of T2 with dense, shorter concolorous hairs; discs of T3–T5 with successively longer, erect, blackish hairs; T1–T5 with successively broader, yellowish white posterior tergal hair bands, weakly developed on T1; T2 without basal tomentum; S2–S5 with very sparse, long fringes of more or less equal width, discs of sterna with scattered long, yellowish brown hairs.

Integument: Completely black, except tarsi partly reddish brown; malar area short, length about 1/3 width of mandibular base; clypeus slightly convex with dense (0.2 pd) coarse punctation, punctures not elongate; integument between punctures slightly shagreened and dull; facial fovea narrow, maximum width about antennal diameter; disc of mesonotum with scattered (1–2 pd) coarse punctation, integument glabrous, surrounded by dense (< 0.5 pd) punctation; upper sloping part of propodeal triangle scabriculous, vertical part glabrous; disc of T1 with fine, scattered (1–2 pd) granulation, becoming denser and shallower towards posterior tergal depression and disappearing along posterior margin; disc of T2 with finer, more distinct, dense (0.5–1 pd) granulation; integument between granulation glabrous.

Male.

Length 11–12 mm.

Vestiture: Face greyish to yellowish brown with numerous blackish hairs intermixed, more dense along inner eye margins, between antennae and on vertex; mesonotum with long, greyish white hairs; mesonotum with long, dark greyish hairs intermixed with numerous longer blackish hairs; mesosomal sides and legs yellowish to greyish white, with some black hairs on legs, scutellum and metanotum with orange-brown hairs, on scutellum intermixed with longer, blackish hairs; T1 very densely covered with very long, erect, yellowish brown hairs; disc of T2 with dense, short, concolorous hairs; discs of T3–T5 with successively longer erect, blackish hairs; relatively broad and distinct white posterior tergal hair bands on T1–T5; S2–S5 with sparse fringes of equal width consisting of very long, yellowish hairs; discs of sterna with long erect, yellowish hairs.

Integument: Completely black, except tarsi partly reddish brown and terga narrowly and indistinctly translucent posteriorly; malar area short, length about 1/3 width of mandibular base; clypeus with very dense, coarse punctation (< 0.2 pd); facial fovea narrow, maximum width about 1/2 antennal diameter; disc of mesonotum with coarse, scattered punctures (1–2 pd), integument glabrous, surrounded by dense (0.5 pd) punctation; upper sloping part of propodeal triangle scabriculous, vertical part chagreened, slightly dull, with some well developed more or less transverse carinae anteriorly; hind basitarsus modified, slightly curved and broadened apically; T1–T4 with bluish shine; discs of T1 and T2 with dense granulation (0.5 pd), granulation becoming indistinct towards posterior tergal depression; integument between punctures superficially shagreened and shiny. Shape of S7 as in Fig. 14 and shape of gonostylus as in Fig. 15.

Holotype: ♂ SOUTH AFRICA: *Northern Cape*: Nieuwoudtville, Wild Flower Reserve, 7.viii.1986, Whitehead, on *Othonna* sp. 2 (SAMC).

Paratypes: SOUTH AFRICA: *Northern Cape*: 6♂ 2♀ Nieuwoudtville, Wild Flower Reserve, 21.vii.1986, Whitehead, on *Othonna* sp. (SAMC, CMK); 1♀ Farm Bloomfontein, 3.x.1985, K. Steiner, on Compositae

1122 (SAMC); 1♀ 8 km E Karkams, 28.vii.1985, V.B. Whitehead, on Asteraceae (SAMC); 1♀ Nieuwoudtville, Wild Flower Reserve, 9.ix.1986, Macpherson, on *Diascia* sp. (SAMC); 1♀ Nieuwoudtville, Farm Glen Lyon, 700 m, 27.viii.2003, M. Kuhlmann, on *Chrysanthemum* sp. (CMK); 1♂ Nieuwoudtville, Wild Flower Reserve, 735 m, 4.ix.2003, M. Kuhlmann, on *Oxalis* sp. (CMK).

Distribution: Restricted to the central part of the winter rainfall area (Fig. 41).

Flower visiting: *Chrysanthemum* sp., *Othonna* sp. (Asteraceae), *Oxalis* sp. (Oxalidaceae), *Diascia* sp. (Scrophulariaceae).

Phenology: First record 21st July, last record 3rd October.

Remarks: This species is treated as *Colletes* sp. D in Kuhlmann (2006).

Colletes infracognitus Cockerell, 1937

Fig. 41

Colletes infracognitus: Cockerell 1937: 137–138. Type locality: South Africa, Worcester.

Diagnosis: Female very similar to other species with a reduced scopa but readily identifiable by the femora of all legs being at least partly orange-red.

Description:

Female.

Length 11–12 mm.

Vestiture: Face short greyish white with long, dark brown hairs on vertex; mesonotum with short, greyish white to yellowish brown hairs intermixed with numerous longer blackish hairs; yellowish white hairs on mesosomal sides and vestiture on legs shorter than on mesonotum, scutellum with short, yellowish white hairs intermixed with longer, blackish hairs, metanotum with short, yellowish white hairs; hairs shorter and partly plumose medially; T1 sparsely covered with moderately long, erect, yellowish white hairs that are shorter posteriorly; disc of T2 densely covered with very short, erect, whitish hairs; discs of T3–T5 with successively longer, erect, blackish hairs; relatively broad white posterior tergal hair bands occur on T1–T5, slightly narrowed medially on T1, narrow on T5; T2 with weakly developed, very narrow basal tomentum; S2–S5 with very short, thin, white fringes, a bit broader laterally; discs of sterna sparsely covered with short hairs.

Integument: Mainly black, antenna dark brown ventrally, femora at least medially on anterior side orange-red, tibiae and tarsi at least partly orange to dark-reddish brown, terga broad translucent yellowish to reddish brown posteriorly, discs of terga with narrow, red, transverse stripe along posterior margin; T1–T3 with slight bluish shine; malar area short, length about 1/3 width of mandibular base; clypeus convex medially, with dense (0.2 pd) small punctures that are slightly elongate; integument between punctures glabrous; facial fovea relatively broad, maximum width about 1.5× antennal diameter; disc of mesonotum relatively dense (0.5–1 pd), fine punctation, surrounded by dense (< 0.5 pd) punctation, integument between punctures glabrous; upper sloping part of propodeal triangle with indistinct, short, longitudinal, carinae, vertical part superficially shagreened and shiny, anteriorly with a few indistinct more or less transverse carinae; disc of T1 with distinct, fine, very dense (< 0.5 pd) punctation, punctures disappearing on posterior tergal depression; disc of T2 with very fine, dense (< 0.5 pd) punctation; integument between punctures shagreened and dull.

Male. Unknown.

Type material examined: *Colletes infracognitus*, ♀ holotype: 'B.M. Type Hym. 17.a.347, *Colletes infracognitus* Ckll. Type, Worcester: Cape Province. Sept. 1928, S. Africa, R.E. Turner, Brit. Mus. 1928-457' (BMNH).

Additional material examined: 16♀. SOUTH AFRICA: *Northern Cape*: 1♀ Engelsepunt, 15 km NW Nieuwoudtville, 830 m, 24.ix.2003, K. Timmermann (CMK); 1♀ Engelsepunt, 15 km NW Nieuwoudtville, 830 m, 6.viii.2003, K. Timmermann (CMK); *Western Cape*: 2♀ Clanwilliam, Ramskop Camp, 21.viii.1984, V.B. Whitehead, on *Trachyandra muricata* (SAMC, CMK); 2♀ Clanwilliam, Ramskop Camp, 20.viii.1984, V.B. Whitehead, on *Homeria miniata* (SAMC, CMK); 1♀ Joostenbergkloof, 31.vii.1981, V.B. Whitehead, on *Dorotheanthus* sp. (SAMC); 1♀ Citrusdal, 8.ix.1966, C.D. Michener (CMK); 2♀ Kunje Farm, 28 km SE Citrusdal, 23.ix.2001, C.D. Eardley (SANC, CMK); 1♀ Worcester, 8.x.1966, C.D. Michener (SEMC); 3♀ Worcester, 30.ix.1966, C.D. Michener (SEMC, CMK); 1♀ Vanrhynsdorp, 30 km N, 146 m, 27.vii.2003, K. Timmermann, on *Augea capensis* (CMK); *Eastern Cape*: 1♀ Willowmore, 3.x.1971, C. Jacot-Guillarmod (CMK).

Distribution: From southern Namaqualand eastwards to Willowmore (Fig. 41).

Flower visiting: *Dorotheanthus* sp. (Aizoaceae), *Trachyandra muricata* (Asphodelaceae), *Homeria miniata* (= *Moraea miniata)* (Iridaceae), *Augea capensis* (Zygophyllaceae).

Phenology: First record 31st July, last record 8th October.

Colletes inornatus Cockerell, 1946

Figs 18, 19, 42

Colletes inornatus: Cockerell 1945 (1946): 836. Type locality: South Africa, Rapenburg, Cape Flats.

Diagnosis: Male best identified by the unique shape of S7 (Fig. 18).

Description:

Female. Unknown.

Male.

Length 11–12 mm.

Vestiture: Face greyish white with a few, dark brown hairs intermixed along inner eye margins and on vertex; mesonotum with long, yellowish white hairs intermixed with longer dark brown hairs; mesosomal sides and legs yellowish white, scutellum and metanotum with long yellowish brown hairs, intermixed with few dark brown hairs on scutellum; T1 densely covered with long, erect, yellowish white hairs; disc of T2 with shorter concolorous hairs; discs of T3–T6 with long, erect, blackish hairs; moderately broad, white, posterior tergal hair bands on T1–T4, very narrow on T5; S2–S5 with dense, very long tuft like fringes laterally, disc of S5 covered with short golden, velveteen pilosity, S6 with a short, longitudinal row of short, reddish brown hairs laterally at base.

Integument: Completely black, except tarsi partly reddish to yellowish brown and terga narrowly translucent posteriorly; T1–T4 with bluish shine; malar area narrow, length about 1/3 width of mandibular base; clypeus with very dense (< 0.2 pd) small punctures; facial fovea narrow, maximum width about antennal diameter; disc of mesonotum with fine scattered granulation, integument densely shagreened and dull, surrounding parts with dense (< 0.2 pd) punctation; upper sloping part of propodeal triangle with short, longitudinal carinae anteriorly, scabriculous posteriorly, vertical part glabrous, anteriorly with 2 or 3 more or less transverse carinae; hind basitarsus modified, slightly curved, with prominent, short, reddish bristles on dorsal apical edge; discs of T1 and T2 with distinct, very fine, dense (< 0.5 pd) punctation, punctures becoming much finer and indistinctly shallow towards posterior tergal depression; integument between punctures glabrous; shape of S7 as in Fig. 18 and shape of gonostylus as illustrated in Fig. 19.

Type material examined: *Colletes inornatus*, ♂ holotype: 'B.M. Type Hym. 17.a.1415, *Colletes inornatus* Ckll. Type, S. Africa. R.E. Turner. 1920-424, Rapenburg. Cape Flats. 1-14.x.1920' (BMNH).

Additional material examined: 3♂. SOUTH AFRICA: *Northern Cape*: 1♂ Hondeklip Bay, Farm Diknek, 20.viii.1991, V.B. Whitehead (CMK); 1♂ Engelsepunt 15 km NW Nieuwoudtville, 830 m, 24.ix.2003, K. Timmermann (CMK); *Western Cape*: 1♂ Kunje Farm, 28 km SE Citrusdal, 760 m, 23–25.ix.2001, B. Danforth (CMK).

Distribution: Only three records from the entire winter rainfall area (Fig. 42).

Flower visiting: Unknown.

Phenology: First record 20th August, last record 14th October.

Colletes karooensis sp. n.

Figs 4, 38, 39, 42

Etymology: Named for the South African landscape of the Karoo.

Diagnosis: Among the species with a reduced scopa, *C. karooensis* is characterised by the unique combination of the following features: hind legs black to dark brown, apical tergal depressions narrowly translucent, metanotum with long, slender hairs (not plumose). Male can be most easily identified by the unique shape of S7 (Fig. 38).

Description:

Female.

Length 9–10 mm.

Vestiture: Face short, greyish to yellowish white, with long, dark brown hairs on vertex; mesonotum with long, yellowish brown hairs intermixed with numerous longer blackish hairs; mesosomal sides with long, and legs with short, white to yellowish white hairs, scutellum and metanotum with short, yellowish brown hairs, medially plumose on metanotum and intermixed with longer blackish on scutellum; T1 very loosely clothed with moderately long, erect, white hairs, shorter posteriorly; disc of T2 sparsely clothed with very short, erect, whitish hairs; discs of T3–T5 with successively longer, erect, blackish hairs; T1–T4 with moderately broad white posterior tergal hair bands, narrowed medially on T1, very narrow on T5; T2 with weak, very narrow basal tomentum medially; sterna without apical fringes; discs of sterna with very few, short depressed hairs.

Integument: Mainly black, antenna dark brown ventrally, legs and tarsi partly dark reddish brown and terga narrowly translucent, reddish brown posteriorly; T1–T3 with slight bluish shine; malar area broad, length about width of mandibular base; clypeus with slight mediolongitudinal depression, relatively dense (0.5 pd) punctation, punctures small and slightly elongate; integument between punctures slightly shagreened and shiny; facial fovea narrow, maximum width about antennal diameter; disc of mesonotum with scattered (1–2 pd), fine punctures, surrounded by relatively dense (0.5 pd) punctation, integument between punctures glabrous; upper sloping part of propodeal triangle with short, longitudinal carinae, vertical part distinctly shagreened and a bit dull; disc of T1 with very fine, indistinct, sparse (1–2 pd) punctation, punctures becoming slightly finer and less distinct towards posterior tergal depression; disc of T2 similar but with very dense (< 0.5 pd) punctation; integument between punctures glabrous.

Male.

Length 9–10 mm.

Vestiture: Face white with a few brown hairs on vertex; mesonotum with long greyish to yellowish white hairs, with very few brown hairs intermixed; mesosomal sides and legs white to yellowish white, scutellum and metanotum with long, yellowish to yellowish brown hairs, scutellum intermixed with a few brown hairs; T1 densely covered with long, erect, yellowish white hairs; disc of T2 and T3 with successively shorter concolorous hairs; discs of T4–T6 with long, erect, blackish hairs; relatively broad, white posterior tergal fringes on T1–T5; S2–S5 with dense yet short fringes, laterally slightly longer than medially.

Integument: Completely black, except antenna brown ventrally, tarsi yellowish brown and terga narrowly translucent posteriorly; T1–T4 with bluish shine; malar area long, length subequal to 3/4 as wide as mandibular base; clypeus with very dense (< 0.2 pd), small punctures; facial fovea narrow, maximum width about 1/2 antennal diameter; disc of mesonotum with medium-sized, relatively dense punctures (0.5–1 pd), integument glabrous, surrounded by dense (0.5 pd) punctation; upper sloping part of propodeal triangle with short, longitudinal carinae, vertical part distinctly shagreened with some weakly developed more or less transverse, short carinae; hind femur with a row of hairs basoventrally; hind basitarsus not modified; discs of T1–T2 with fine, dense (< 0.5 pd) punctation, punctures becoming less distinct on posterior tergal depression; integument between punctures glabrous. Shape of S7 as in Fig. 38 and shape of gonostylus as in Fig. 39.

Holotype: ♂ SOUTH AFRICA: *Western Cape*: Sandberg Station, Droogerivier, 27.viii.1987, V.B. Whitehead, on *Homeria* (SAMC).

Paratypes: SOUTH AFRICA: *Western Cape*: 5♂ same data as holotype (SAMC, CMK); 2♂ Hout Bay, opposite Duiker Island, 31.viii.1986, K. Steiner (SAMC); 1♂ Darling to Yzerfontein, 19.ix.1986, V.B. Whitehead (SAMC); 2♂ Farm Droogerivier, 8.ix.1987, K. Steiner, on *Homeria miniata* (SAMC); 1♂ Milnerton, ix.1965, F. Gess (SAMC); 1♂ 2♀ Pearly Beach, Bredasdorp, ix.1959 (SAMC, CMK); 1♂ 2♀ Lamberts Bay, 21 km E, 22.ix.2001, C. Eardley (SANC, CMK); 1♂ Clanwilliam, 8.ix.1966, M. & C.D. Michener (CMK); 2♀ Vanrhynsdorp, 30 km N, 146 m, 22.viii.2003, K. Timmermann (CMK).

Distribution: Scattered records from the central and southern parts of the winter rainfall area (Fig. 42).

Flower visiting: *Homeria miniata* (= *Moraea miniata*), *Homeria* sp. (Iridaceae).

Phenology: First record 22nd August, last record 22nd September.

Remarks: This species is treated as *Colletes* sp. E in Kuhlmann (2006).

Colletes katharinae sp. n.

Figs 34, 35, 42

Etymology: This species is named for Katharina.

Diagnosis: Male best identified by the unique shape of S7 (Fig. 34) and the gonostylus (Fig. 35).

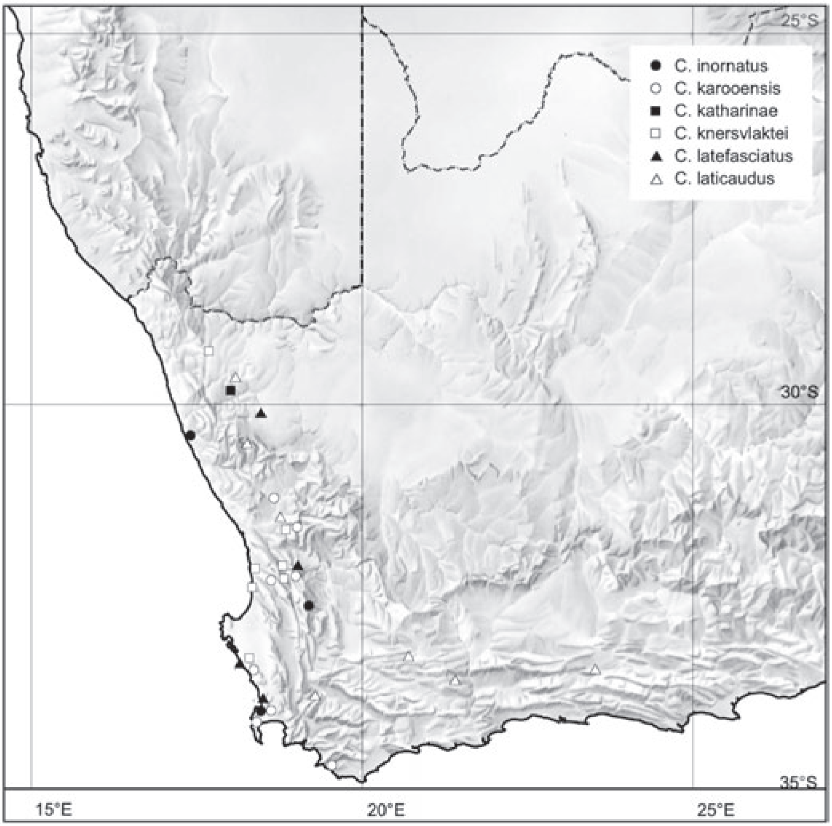


Fig. 42. Distribution of *C. inornatus*, *C. karooensis*, *C. katharinae*, *C. knersvlaktei*, *C. latefasciatus* and *C. laticaudus*.

Description:

Female. Unknown.

Male.

Length 10–11 mm.

Vestiture: Face greyish white to white, with brown hairs intermixed on vertex; mesonotum with long, greyish white to white, with scattered brown hairs on posterior half; mesosomal sides and legs white, scutellum and metanotum with long, yellowish brown hairs, scutellum intermixed with a few black hairs; hind femora with a dense row of white, erect hairs of equal length basoventrally, more or less on longitudinal axis; T1 densely covered with long, erect, yellowish brown hairs; disc of T2 with shorter, concolorous hairs; discs of T3–T6 with long, erect, blackish hairs; narrow, very sparse, white posterior fringes on T1–T5; T2–T5 with few, but very long, erect hairs laterally; S2–S5 with sparse fringes of long hairs, laterally only slightly longer than medially, discs with very long, erect, white hairs; S6 with an elongate brush of dense, short, white bristles basolaterally, medially long hairs curved towards median line.

Integument: Completely black, except tarsi reddish brown and terga narrowly translucent posteriorly; malar area long, about 1–1.2× as long as mandibular base width; clypeus with very dense (< 0.2 pd), small punctures; facial fovea narrow, maximum width about 1/2 antennal diameter; disc of mesonotum with medium-sized, relatively dense (0.5–1 pd) punctation, integument between punctures glabrous, surrounded by slightly denser punctation; upper sloping part of propodeal triangle with short longitudinal carinae, vertical part densely shagreened and relatively dull; hind basitarsus modified, with a slight longitudinal bend and broadened apically, and prominent long, reddish bristles on dorsoapical edge; integument of terga finely granular and dull, less pronounced on more shagreened posterior tergal depression; shape of S7 as in Fig. 34 and shape of gonostylus as illustrated in Fig. 35.

Holotype: ♂ SOUTH AFRICA: *Northern Cape*: Hester Malan Nat. Res., 31.v.1985, M. Struck (SANC).

Paratypes: SOUTH AFRICA: *Northern Cape*: 6♂ same data as holotype (SANC, CMK).

Distribution: Only known from the Goegap Nature Reserve near Springbok in Northern Cape (Fig. 42).

Flower visiting: Unknown.

Phenology: Only recorded from 31st May.

Colletes knersvlaktei sp. n.

Figs 28, 29, 42

Etymology: Named for the Knersvlakte, a landscape around Vanrhynsdorp renowned for its rich succulent flora.

Diagnosis: Male is best identified by the unique shape of S7 (Fig. 28).

Description:

Female. Unknown.

Male. Length 10–11 mm.

Vestiture: Face greyish white to white, with a few brown hairs intermixed on vertex; mesonotum with long, greyish white hairs, with a few brown hairs on posterior half; mesosomal sides and legs white, scutellum and metanotum with long, yellowish brown hairs, intermixed with black on scutellum; hind femora with a dense row of yellowish brown, erect hairs of equal length more or less on longitudinal axis basoventrally; T1 densely covered with long, erect, yellowish brown hairs; disc of T2 with shorter concolorous hairs; discs of T3–T6 with long, erect, blackish hairs; T1–T4 with narrow, very sparse, white posterior tergal fringes, very sparse on T5; S2–S5 with dense, long fringes, laterally broader than medially, discs with numerous long, erect, white hairs.

Integument: Completely black, except antenna brown ventrally, legs and tarsi partly reddish brown and terga very narrowly translucent posteriorly; malar area short, about 3/4 width of mandibular base; clypeus with very dense (< 0.2 pd), small punctures; facial fovea narrow, maximum width about 1/2 antennal diameter; disc of mesonotum with fine, dense punctation (0.5–1 pd), integument between punctures glabrous, surrounded by relatively dense punctation (0.5–1 pd); upper sloping part of propodeal triangle with short, longitudinal carinae, vertical part slightly shagreened, shiny, with few short, indistinct more or less transverse carinae; mid and hind femora slightly swollen; hind basitarsus modified, slightly bent longitudinally, and broadened apically, with prominent, long, reddish bristles on dorsoapical edge; integument of terga finely granular and shiny, less pronounced on nearly smooth posterior tergal depression; S6 basolaterally with a flattened, thick, stout backwards directed spine; shape of S7 as illustrated (Fig. 28) and shape of gonostylus as in Fig. 29.

Holotype: ♂ SOUTH AFRICA: *Northern Cape*: Steinkopf, L. Schultze S., identified by Friese as *Colletes schultzei* (TMSA).

Paratypes: SOUTH AFRICA: *Western Cape*: 1♂ Vanrhynsdorp, vii–viii.1927, G. v. Son (TMSA); 1♂ Darling, 22.viii.1999, P. Goldblatt, on *Ixia scillaris* (SEMC); 1♂ Clanwilliam, 10 km N, 30.vii.1983, V.B. Whitehead, on *Griellum*, pink *Ruschia* (SAMC); 1♂ Eland's Bay, 30.vii.1987, V.B. Whitehead (SAMC); 1♂ Graafwater, 5 km W, 2.vi.1984, V.B. Whitehead (SAMC); 1♂ Clanwilliam, Ramskop, 9.vii.1984, V.B. Whitehead, on pink *Ruschia* (CMK); 1♂ Graafwater, 5 km W, 21.vi.1984, V.B. Whitehead (CMK).

Distribution: Scattered records from much of the winter rainfall area (Fig. 42).

Flower visiting: *Ruschia* sp. (Aizoaceae), *Ixia scillaris* (Iridaceae), *Grielum* sp. (Neuradaceae).

Phenology: First record 2nd June, last record 22nd August.

Colletes latefasciatus Friese, 1925

Fig. 42

Colletes latefasciatus: Friese 1925: 524. Type locality: South Africa, Capland.

Diagnosis: Female readily identifiable by the very broad, conspicuous, yellowish posterior tergal fringes.

Description:

Female.

Length 12–13 mm.

Vestiture: Face white to greyish white with blackish hairs intermixed on vertex; mesonotum with short, yellowish white hairs intermixed with numerous longer blackish hairs; sides of mesosomal and legs yellowish to greyish white, scutellum and metanotum with short, yellowish brown hairs, intermixed with longer blackish hairs on scutellum; scopa dark brown dorsally, yellowish brown ventrally; T1 sparsely clothed with short, erect yellowish white hairs; disc of T2 very densely hirsute, with very short, yellowish brown hairs; discs of T3–T5 with successively longer erect, blackish hairs; very broad yellow to yellowish brown posterior tergal fringes on T2–T4, distinctively narrower on T1 and T5, consisting of very short (but longer than in *C. fasciatus*), dense pilosity; T2 without basal tomentum; S2 with sparse fringe of long, yellowish white hairs, shorter and less developed on S3–S4 on which hairs are longer laterally than medially, S5 clothed with long, brownish hairs.

Integument: Completely black, except tarsi sometimes slightly brownish and T1 posteriorly broadly translucent; malar area short, length about 1/2 width of mandibular base; clypeus with dense (0.2 pd), medium-sized punctures, punctures slightly elongate forming indistinct more or less U-shaped carinae on lower part of clypeus; integument between punctures glabrous; facial fovea narrow, maximum width about 3/4 antennal diameter; disc of mesonotum with dense (0.5–1 pd), coarse punctation, integument glabrous between punctures, surrounded by dense (< 0.5 pd) punctation; upper sloping part of propodeal triangle with short longitudinal carinae, vertical part superficially shagreened and slightly dull; disc of T1 with distinct, fine, very dense (< 0.5 pd) punctation, punctures becoming finer, more shallow and denser towards posterior tergal depression, nearly disappearing on posterior margin; disc of T2 with very fine, dense (< 0.5 pd) punctation; integument between punctures glabrous.

Male. Unknown.

Type material examined: *Colletes latefasciatus*, ♀ lectotype: 'Capland, *Colletes latefasciatus* 1910 Friese det., Type, Coll. Friese' (ZMHB).

Additional material examined: 24♀. SOUTH AFRICA: *Northern Cape*: 18♀ Leliefontein, 2.x.1995, F.W. & S.K. Gess, on pink *Ruschia* (AMGS, CMK); *Western Cape*: 2♀ Ysterfontein, 1.ix.1960 (SAMC); 4♀ Pakhuis Pass, 7.ix.1987, C.D. Eardley (SANC).

Distribution: Scattered records from much of the winter rainfall area (Fig. 42).

Flower visiting: *Ruschia* sp. (Aizoaceae).

Phenology: First record 1st September, last record 2nd October.

Colletes laticaudus Cockerell, 1946

Figs 3, 24, 25, 42

Colletes laticaudus: Cockerell 1945 (1946): 850–851. Type locality: South Africa, Matjesfontein.

Diagnosis: Among the species with a reduced scopa is the following unique combination of characters: hind legs black to dark brown, hind tibia with dense short hairs dorsally (Fig. 3), apical tergal depressions broadly translucent. Male best identified by the unique shape of S7 (Fig. 24).

Description:

Female.

Length 11–12 mm.

Vestiture: Face yellowish,white with longer, dark brown hairs on vertex; mesonotum with short, yellowish brown hairs intermixed with numerous longer blackish hairs; hairs on side of mesosoma longer, and those on legs shorter and yellowish white, scutellum and metanotum with short, orange-brown hair, metanotum with a tuft of coloured plumose hairs medially; T1 sparsely covered with moderately long, erect, yellowish brown hairs; disc of T2 with very short, erect, yellowish hairs; discs of T3–T5 with successively longer, erect, blackish hairs; T1–T4 with relatively broad, white posterior fringes, that on T1 narrow medially, and on T5 entirely very narrow; T2 with narrow basal tomentum; S2–S4 with very sparse, short, white, fringes laterally; discs of sterna loosely clothed with very short hairs.

Integument: Mainly black, antenna brown ventrally, legs partly reddish brown and terga translucent yellowish or reddish brown posteriorly; discs of T1–T4 with narrow, red posterior margins; malar area narrow, length about 1/2 to 3/4 width of mandibular base; clypeus slight depressed medially, with dense (0.2 pd) small punctures that are very slightly elongate; integument between punctures glabrous; facial fovea broad, maximum width about 2× antennal diameter; disc of mesonotum glabrous, surrounded by dense (0.5 pd) punctation, integument between punctures glabrous; upper sloping part of propodeal triangle with short, longitudinal carinae, vertical part superficially shagreened and shiny; disc of T1 with distinct, fine, dense (0.5 pd) punctation, punctures becoming slightly finer and indistinctly shallow towards posterior tergal depression;

disc of T2 with fine, dense (< 0.5 pd) punctation; integument between punctures smooth and shiny.

Male.

Length 10–12 mm.

Vestiture: Face white; mesonotum with long, white to greyish white hairs; mesosomal sides and legs white to greyish white, scutellum and metanotum with long yellowish to yellowish white hairs, scutellum with a few brown hairs intermixed; T1 very densely covered with long, erect, yellowish brown hairs; disc of T2–T3 with successively shorter, concolorous hairs; T4–T5 with long, erect, black hairs; relatively broad white posterior fringes on T1–T4, that on T1 indistinct; S2–S5 with dense but short fringes, laterally longer than medially, discs of S2–S3 with velvutine pilosity posteriorly, widest medially.

Integument: Completely black, except antenna brown ventrally, legs reddish brown, tarsi reddish brown to yellowish brown and terga narrowly translucent posteriorly; discs of T1–T3 with very narrow, red posterior margin; T1–T2 partly with very slight bluish shine; malar area long, length subequal to width of mandibular base; clypeus with very dense, small punctures (< 0.2 pd); facial fovea broad, maximum width about 1.5× antennal diameter; disc of mesonotum with fairly coarse, scattered punctures (1–1.5 pd), integument glabrous, surrounded by slightly denser (0.5 pd) punctation; upper sloping part of propodeal triangle scabiculous, vertical part superficially chagreened and shiny, anterior margin with 2 or 3 short, weakly developed more or less transverse carinae; hind basitarsus slightly broadened apically with prominent, long, reddish bristles on dorsoapical edge; discs of T1 and T2 with fine and dense (0.5 pd) granulation, granulation fades towards posterior tergal depression, which is nearly smooth and shiny; integument between granulation smooth and shiny. Shape of S7 as in Fig. 24 and shape of gonostylus as illustrated (Fig. 25).

Type material examined: *Colletes laticaudus*, ♀ holotype: 'B.M. Type Hym. 17.a.1433, *Colletes laticaudus* CKLL. Type, S. Africa, R.E. Turner, Brit. Mus. 1928-480, Cape Province, Matjesfontein, 6-15.x.1928' (BMNH).

Additional material examined: 11♀ 11♂. SOUTH AFRICA: *Northern Cape*: 1♂ Hester Malan Nat. Res., 19.viii.1986, M. Struck, on *Ruschia elineata* (TMSA); 1♂ 2.viii.1986, idem, (CMK); 2♀ Hester Malan Nat. Res., 3.x.1987, M. Struck, on *Ruschia cymosa* (SANC, CMK); 2♀ 30.ix.1986, idem (SANC); 1♀ Hester Malan Nat. Res., 12.viii.1985, M. Struck, on *Conicosia elongata* (SANC); *Western Cape*: 1♂ Vanrhynsdorp, 2 km N, 27.vii.1985, V.B. Whitehead, on pink mesem (SAMC); 1♀ Leliefontein, 17.ix.2003, C. Mayer (CMK); 1♀ Worcester, 300 m, 8.x.1966, C.D. Michener (CMK); 1♀ Worcester, 30.ix.1966, C.D. Michener (CMK); 2♀ Ladismith, 24.ix.1948, C. Jacot-Guillarmod (AMGS); *Eastern Cape*: 1♂ Willowmore, 25.viii.1918, Dr Brauns (TMSA); 1♀ 25.viii.1906, 1♂ 5.viii.1920, 2♂ 20.viii.1909, 1♂ 10.ix.1918, 2♂ 15.viii.1917, 1♂ 20.viii.1920, idem (CMK).

Distribution: Scattered records from much of the winter rainfall area, eastwards to Willowmore (Fig. 42).

Flower visiting: *Conicosia elongata*, *Ruschia cymosa*, *Ruschia elineata* (Aizoaceae).

Phenology: First record 27th July, last record 15th October.

Colletes nieuwoudtvillei sp. n.

Figs 32, 33, 43

Etymology: Named for the town Nieuwoudtville.

Diagnosis: Male best identified by the unique shape of S7 (Fig. 32).

Description:

Female. Unknown.

Male.

Length 10–11 mm.

Vestiture: Face yellowish brown with black hairs intermixed along inner eye margins; mesonotum with long, yellowish brown hairs intermixed with a few longer, black hairs; mesosomal sides and legs yellowish brown, scutellum and metanotum with long, orange-brown hairs intermixed with a few brownish hairs; T1 densely covered with long, erect, yellowish brown hairs; disc of T2 with shorter concolorous hairs; discs of T3–T6 with long, erect, blackish hairs; T1–T5 with broad, thin white posterior tergal hair bands on; S2–S5 with dense but relatively short fringes laterally.

Integument: Completely black, except tarsi partly reddish to yellowish brown, terga narrowly translucent posteriorly; malar area short, about 1/2 as long as width of mandibular base; clypeus with very dense (< 0.2 pd), small punctures; facial fovea narrow, maximum width about 3/4 antennal diameter; disc of mesonotum with medium-sized, scattered punctation (1 pd), integument between punctures smooth and shiny, surrounded by denser (0.5 pd) punctation; upper sloping part of propodeal triangle with a few, short, longitudinal carinae, vertical part glabrous; mid femur broadest near base, forming a right-angled edge with a stout ridge ventrally; femur slightly swollen; hind basitarsus slightly broadened apically with prominent, short, reddish bristles on dorso-apical edge; discs of T1 and T2 with fine, dense (0.5–1 pd) punctation, punctures becoming more scattered towards posterior tergal depression; integument between punctures smooth and shiny; shape of S7 as in Fig. 32 and shape of gonostylus as illustrated (Fig. 33).

Holotype: ♂ SOUTH AFRICA: *Northern Cape*: Nieuwoudtville, Wild Flower Reserve, 4.viii.1988, V.B. Whitehead, on *Arctotheca calendula* (SAMC).

Paratypes: SOUTH AFRICA: *Northern Cape*: 5♂ same data as holotype (SAMC, CMK); 2♂ Nieuwoudtville, Wild Flower Reserve, 21.vii.1986, Whitehead, on *Othonna* sp. (SAMC, CMK); 1♂ Nieuwoudtville, Wild Flower Reserve, 31.vii.1987, V.B. Whitehead, on yellow *Senecio* (SAMC); 1♂ Nieuwoudtville, Wild Flower Reserve, 5.viii.1988, K. Steiner (CMK); 1♂ Nieuwoudtville, Farm Glen Lyon, 700 m, 30.viii.2003, M. Kuhlmann, on *Chrysanthemum* sp. (CMK).

Distribution: This species is only known from the Nieuwoudtville vicinity (Fig. 43).

Flower visiting: *Arctotheca calendula*, *Chrysanthemum* sp., *Othonna* sp., *Senecio* sp. (Asteraceae).

Phenology: First record 21st July, last record 30th August.

Colletes obscurus Friese, 1925

Fig. 43

Colletes obscurus: Friese 1925: 528. Type locality: South Africa, Zeerust.

Diagnosis: Among the species with a reduced scopa, it is very similar to *C. cyanonitidus* but has a less intense bluish shine on T1 and T2, lacks the numerous transverse carinae on the vertical part of the propodeal triangle and has more scattered and shallower punctation on T1.

Description:

Female.

Length 10–11 mm.

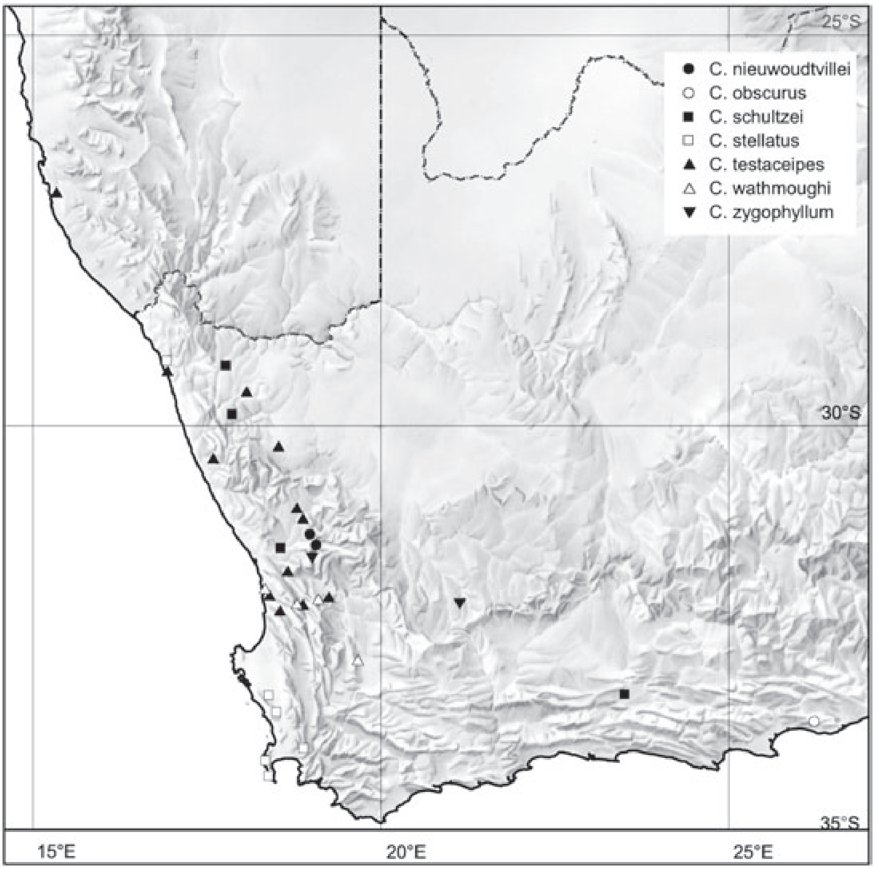


Fig. 43. Distribution of *C. nieuwoudtvillei*, *C. obscurus*, *C. schultzei*, *C. stellatus*, *C. testaceipes*, *C. wathmoughi* and *C. zygophyllum*.

Vestiture: Face short, greyish white with long, dark brown hairs onvertex; mesonotum with short, yellowish brown hairs intermixed with numerous longer blackish hairs; mesosomal sides and legs with yellowish white, the former longer and the latter shorter than mesonotal vestiture, scutellum and metanotum with short, medially plumose (cf. Fig. 5), brownish orange hairs, scutellum with intermixed short yellowish white and longer blackish hairs; T1 very sparsely clothed with moderately long, erect, white hairs, shorter posteriorly; disc of T2 sparsely covered with very short, depressed, whitish hairs; discs of T3–T5 with successively longer, erect, blackish hairs; moderately broad white posterior tergal fringes on T1–T4, that on T1 slightly narrowed medially, that on T5 very narrow; T2 without basal tomentum; S2–S4 with very short, indistinct, white fringes laterally; discs of sterna very sparsely clothed with very short hairs.

Integument: Mainly black, antenna reddish brown ventrally, legs and tarsi partly with a reddish shine and terga posteriorly narrowly translucent, reddish brown; T1–T3 with bluish shine; malar area narrow, length about 1/2 width of mandibular base; clypeus slightly depressed medially, with very dense (0.2 pd), small punctures, punctures slightly elongate; integument between punctures smooth and shiny; facial fovea broad, maximum width about 1.5× antennal diameter; disc of mesonotum without or with very scattered (2–4 pd), medium-sized punctation, surrounded by dense (0.5–1 pd) punctation, integument between punctures smooth and shiny; upper sloping part of propodeal triangle with short, longitudinal carinae, vertical part distinctly shagreened, dull with numerous well-developed more or less transverse carinae; disc of T1 with fine, dense (0.5–1 pd) punctation, punctures becoming finer and denser towards posterior tergal depression; disc of T2 with very fine, and very dense (< 0.5 pd) punctation; integument between punctures smooth and shiny.

Male. Unknown.

Type material examined: *Colletes obscurus*, ♀ lectotype: 'Transvaal, Zeerust, 1897, Jensen, *Colletes obscurus* 1921 Friese det., Type, Coll. Friese' (ZMHB).

Additional material examined: 2♀. SOUTH AFRICA: *Eastern Cape*: 1♀ Grahamstown, 14.ix.1968, J.G.H. Londt (CMK). ZAMBIA: 1♀ Mbala (Abercorn), 14.xii.1953, H.D. Brown (AMGS).

Distribution: The only reliable record is from Grahamstown (Fig. 43). The records from Abercorn (= Mbala, northern Zambia) and Zeerust (North West Province, South Africa) are probably errors caused by confusion of localities or by mislabelling and are not included in the distribution map.

Flower visiting: Unknown.

Phenology: First record 14th September, last record 14th December.

Colletes schultzei Friese, 1909

Figs 26, 27, 43

Colletes schultzei: Friese 1909: 122. Type locality: South Africa, Steinkopf.

Diagnosis: Male can be most accurately identified by the unique shape of S7 (Fig. 26).

Description:

Male.

Length 10–11 mm.

Vestiture: Face greyish white to white; mesonotum with long, greyish white to yellowish white hairs; mesosomal sides and legs white; scutellum and metanotum with long, yellowish to white hairs; hind femur basoventrally with a dense row of brown, erect hairs of equal length on longitudinal axis; T1 densely covered with long, erect, yellowish white hairs; disc of T2–T3 with successively shorter concolorous hairs; discs of T4–T6 with long, erect, blackish hairs; narrow and very sparse white posterior tergal fringes on T1–T4; S1–S5 with short, sparse fringes, laterally much broader than medially, discs with few depressed white hairs.

Integument: Completely black, except antenna yellowish brown ventrally, legs and tarsi partly reddish brown and terga narrowly translucent posteriorly; malar area long, about 1–1.2× as long as width of mandibular base; clypeus with very dense, small punctures (< 0.2 pd); facial fovea narrow, maximum width about antennal diameter; disc of mesonotum with fine, very scattered punctation (4–5 pd), integument between punctures smooth and shiny, surrounded by only relatively dense punctation (0.5–1 pd); upper sloping part of propodeal triangle with short longitudinal carinae, vertical part glabrous; mid and hind femora slightly swollen; hind basitarsus slightly curved and broadened apically with prominent, long, reddish bristles on dorsal apical edge; integument of T1 with fine, dense (0.5–1 pd) punctation, punctures shallower and indistinct on posterior tergal depression; T2 with very fine, dense (< 0.5 pd) punctures, integument between punctation smooth and shiny; S6 basolaterally with a short, posterior directed spine; shape of S7 as illustrated (Fig. 26) and shape of gonostylus as in Fig. 27.

Female. Unknown.

Type material examined: *Colletes schultzei*, ♂ lectotype: 'Kl. Namaland, Steinkopf, L. Schultze S., *Colletes schultzei* 1908 Friese det., Type, Coll. Friese', 2♂ paralectotypes: same data as lectotype (all ZMHB).

Additional material examined: 22♂. SOUTH AFRICA: *Northern Cape*: 1♂ Goegap Nat. Res., 7.ix.1992, F.W. & S.K. Gess, on *Drosanthemum hispidum* (CMK); *Western Cape*:1♂ Vanrhynsdorp, vii–viii.1927, G. v. Son (TMSA); 1♂ Vanrhynsdorp, 15.viii.2003, K. Timmermann (CMK); *Eastern Cape*: 1♂ Willowmore, 1.viii.1916, Dr Brauns (SAMC); 2♂ Willowmore, 20.viii.1909, Dr Brauns (TMSA); 5♂ 30.vii.1920, 3♂ 20.viii.1917, 2♂ 15.viii.1902, 1♂ 18.viii.1906, 2♂ 5.viii.1920, 1♂ 6.ix.1919, 1♂ 19.ix.1904, 1♂ 15.ix.1902, idem (CMK).

Distribution: Only known by few individuals from Namaqualand and Willowmore (Fig. 43).

Flower visiting: *Drosanthemum hispidum* (Aizoaceae).

Phenology: First record 30th July, last record 19th September.

Colletes stellatus Cockerell, 1946

Fig. 43

Colletes stellatus: Cockerell 1945 (1946): 842. Type locality: South Africa, Stellenbosch.

Diagnosis: Female very similar to other species with a reduced scopa but only the hind leg is red.

Description:

Female.

Length 11–12 mm.

Vestiture: Face short, greyish white with long, dark brown hairs on vertex; mesonotum with relatively long, greyish white to yellowish brown hairs intermixed with numerous longer, blackish hairs; mesosomal sides and legs with yellowish white hairs, those on former longer and those on latter shorter than mesonotum, scutellum with long, orange-brown hairs intermixed with longer blackish hairs, metanotum with short, yellowish brown hairs, hairs shorter and plumose medially; T1 sparsely covered with moderately long, erect, yellowish white hairs, shorter posteriorly; disc of T2 with few very short, erect, whitish hairs; discs of T3–T5 with short, successively longer, erect, blackish hairs; relatively broad white posterior tergal fringes on T1–T5, slightly narrowed medially on T1, narrow on T5; T2 with very weakly developed, very narrow basal tomentum; S2–S5 with very short, thin white fringes; discs of sterna sparsely covered with short hairs.

Integument: Mainly black, antenna dark brown ventrally, hind legs red, except trochanter, apical part of femur and base and apex of tibia, tarsi of fore and mid legs partly yellowish brown, mid femur partly dark reddish brown, terga narrowly translucent, reddish brown posteriorly; T1–T3 with slight bluish shine; malar area short, length about 1/2 width of mandibular base; clypeus slightly flattened medially, with dense (0.2 pd), small punctures that slightly elongate; integument between punctures smooth and shiny; facial fovea narrow, maximum width subequal to antennal diameter; disc of mesonotum with relatively dense (0.5–1 pd), fairly coarse punctation, surrounded by dense (< 0.5 pd) punctation, integument between punctures smooth and shiny; upper sloping part of propodeal triangle with short, longitudinal carinae, vertical part superficially shagreened and shiny, anteriorly with a few indistinct semi-transverse carinae; disc of T1 with distinct, fine, dense (0.5 pd) punctation, punctures becoming much denser, finer, indistinctly shallow towards posterior tergal depression; disc of T2 with very fine, dense (< 0.5 pd) punctation; integument between punctures smooth and shiny.

Male. Unknown.

Type material examined: *Colletes stellatus*, ♀ holotype: 'B.M. Type Hym. 17.a.1423, *Colletes stellatus* Ckll. Type, Stellenbosch, 17.9.23, C.J. Joubert, *Colletes* sp.' (BMNH).

Additional material examined: 5♀. SOUTH AFRICA: *Northern Cape*: 1♀ Port Nolloth, 23.ix.1967, E.S. Ross & A.R. Stephen (CMK); *Western Cape*: 1♀ Hopefield, 1.ix.1960 (SAMC); 1♀ Kommetjie, 25.x.1972, J.G. Rozen, R. McGinley & C. Thompson (AMNH); 1♀ Cape of Good Hope Nat. Res., Olifantsbos, 17–19.ix.1993, H.G. Robertson (SAMC); 1♀ Mamre, 19.ix.1986, V.B. Whitehead (CMK).

Distribution: Most specimens are from the south-western Cape, but an isolated record from Port Nolloth in northern Namaqualand (Fig. 43).

Flower visiting: Unknown.

Phenology: First record 1st September, last record 25th October.

Colletes testaceipes Friese, 1909

Figs 16, 17, 43

Colletes testaceipes: Friese 1909: 120–121. Type locality: Namibia, Prince of Wales Bay.

Diagnosis: Among the species with a reduced scopa, *C. testaceipes* is characterised by the following combination of characters: tibiae completely orange-brown to red, width of facial fovea about 2× diameter of antennal flagellum, hairs on disc of mesonotum about 2× as long as diameter of antennal flagellum. Male best identified by the unique shape of S7 (Fig. 16).

Description:

Female.

Length 12–13 mm.

Vestiture: Face greyish white, with longer, yellowish brown hairs on vertex; mesonotum with relatively long, greyish or yellowish white hairs intermixed with numerous longer blackish hairs; mesosomal sides and legs similar to mesonotum, except hairs shorter on mesosomal side and legs; scutellum and metanotum with short, yellowish white vestiture, on scutellum intermixed with longer, light brown hairs, metanotum medially plumose; T1 densely covered with moderately long, erect, white hairs, posteriorly with a few very short, depressed hairs; disc of T2 with very short, erect, yellowish hairs; discs of T3–T5 with successively longer, erect, blackish hairs; relatively broad, white, posterior tergal fringes on T1–T4, narrowed medially on T1, very narrow on T5; T2 with well developed, relatively broad basal tomentum; S2–S5 with very short, thin sparse white hair fringes laterally; discs of sterna loosely covered with very short hairs.

Integument: Mainly black, antenna brown ventrally, legs red and terga translucent yellowish to reddish brown posteriorly; discs of T1–T4 with narrow red margin posteriorly; T1 with very slight bluish shine; malar area narrow, length about 1/3 width of mandibular base; clypeus slight depressed medially, with dense (0.2 pd), small punctures, punctures slightly elongate; integument between punctures smooth and shiny; facial fovea broad, maximum width about 2× antennal diameter; disc of mesonotum with relatively sparse (1–2 pd), medium-sized punctures, surrounded by dense (< 0.5 pd) punctation, integument between punctures smooth and shiny; upper sloping part of propodeal triangle with short, longitudinal carinae, vertical part superficially shagreened and shiny, anteriorly with few indistinct roughly transverse carinae; disc of T1 with distinct, fine to very fine, dense (0.5 pd) punctation, punctures becoming much finer and indistinctly shallow towards posterior tergal depression; disc of T2 with fine and dense (< 0.5 pd) punctation; integument between punctures smooth and shiny.

Male.

Length 10–12 mm.

Vestiture: Face white; mesonotum with long, white to greyish white hairs; mesosomal sides and legs white to greyish white, scutellum and metanotum with long, yellowish to yellowish white hairs; T1 densely covered with long, erect, greyish white hairs; disc of T2–T6 with successively shorter concolorous hairs of same colour; relatively broad white posterior tergal fringes on T1–T4, narrower on T5 and very narrow on T6; S1–S5 with dense, long fringes that are longer laterally than medially.

Integument: Completely black, except antenna brown ventrally, legs reddish brown becoming more yellowish brown on tarsi; terga narrowly translucent posteriorly; discs of T1–T3 with very narrow, red posterior margin; T1–T4 with slight bluish shine; malar area long, length subequal to width of mandibular base; clypeus with very dense, small punctures (< 0.2 pd); facial fovea narrow, maximum width equal to antennal diameter; disc of mesonotum with medium-sized, scattered punctures (1 pd), integument glabrous, surrounded by slightly denser (0.5 pd) punctation; upper sloping part of propodeal triangle with around 3 short, longitudinal carinae, vertical part superficially shagreened and shiny, upper half with 2 or 3 large, roughly transverse carinae; hind basitarsus not modified; discs of T1 and T2 with coarse, distinct, dense (< 0.2 pd) punctation, punctures becoming slightly finer and more shallow towards anterior part of posterior tergal depression, nearly smooth and shiny posteriorly; integument between punctures smooth and shiny. Shape of S7 as in Fig. 16 and shape of gonostylus as illustrated (Fig. 17).

Type material examined: *Colletes testaceipes*, ♂ lectotype: 'Prince of Wales-Bay, L. Schultze S., Type, *Colletes testaceipes* 1908 Friese det., L. Schultze. Süd-Afrika, 1903, Mai, Pr. of Wales Bay, No. 135, Konserv. Alk. 94', ♀ Paralectotype: 'SW. Afrika, Grotfontein, 1903, Volkmann, *Colletes testaceipes* 1908 Friese det., Type, Coll. Friese' (all ZMBH).

Additional material examined: 20♀ 4♂. SOUTH AFRICA: *Northern Cape*: 2♂ Port Nolloth, viii.1890, R.M.L. (CMK); 2♀ Wallekral, 7 km WNW on road to Hondeklip Bay, 14–16.ix.1992, F.W. & S.K. Gess, on yellow Fabaceae (AMGS, CMK); 4♀ Hester Malan Nat. Res., 30.viii.1987, M. Struck, on *Conicosia elongata* (SANC, CMK); 1♀ 5.ix.1986, (SANC), idem; 1♀ Hester Malan Nat. Res., 2.vii.1985, M. Struck (SANC); 1♀ Hester Malan Nat. Res., 9.vii.1985, M. Struck, on *Ruschia elineata* (SANC); 6♀ Leliefontein, 2.x.1995, F.W. & S.K. Gess, on pink *Ruschia* (AMGS, CMK); *Western Cape*: 1♂ Kalkgat (Farm), 55 km NE Vanrhynsdorp, 140 m, 3.ix.2003, K. Timmermann, on mesem (CMK); 1♂ Vanrhynsdorp, 45 km NE, 140 m, 20.vii.2003, K. Timmermann (CMK); 1♀ Lamberts Bay, 20 km E, 13.ix.1984, V.B. Whitehead (SAMC); 1♀ Drooge Rivier, Sandberg, 27.viii.1987, V.B. Whitehead, on *Homeria* (SAMC); 1♀ Klawer, 7 km N, 27.vii.1985, V.B. Whitehead, on *Apartesia* (SAMC); 1♀ Clanwilliam, 8.ix.1966, C.D. Michener (CMK); 1♀ Biedouw Valley, 5–7.ix.1987, C.D. Eardley (CMK).

Distribution: This species distribution extends from south-western Namibia, which is the northern part of the winter rainfall area to southern Namaqualand, which is in the middle of the winter rainfall area (Fig. 43). The isolated record from 'Grotfontein' (= Grootfontein, Namibia) is probably an error caused by incorrect labelling and is not included in the distribution map.

Flower visiting: *Apatesia* sp., *Conicosia elongata*, *Ruschia elineata*, *Ruschia* sp. (Aizoaceae), yellow Fabaceae, *Homeria* sp. (= *Moraea* sp.) (Iridaceae).

Phenology: First record 2nd July, last record 2nd October.

Colletes watmoughi sp. n.

Fig. 43

Etymology: This species is named for the South African entomologist Richard Watmough, who first collected this species.

Diagnosis: Among the species with a normal scopa, *C. watmoughi* is characterised by the following combination of characters: scutellum without black hairs, malar area as broad as basal width of mandible, supraclypeal area between punctures glabrous.

Description:

Female.

Length 10–11 mm.

Vestiture: Face greyish white, with blackish hairs intermixed on vertex; mesonotum with relatively long greyish or yellowish white hairs intermixed with numerous longer blackish hairs; mesosomal sides and legs greyish or yellowish white, scutellum and metanotum with long, yellowish brown hairs, intermixed with longer, blackish hairs; scopa dark brown dorsally and yellowish brown ventrally; T1 densely clothed with long, erect, yellowish brown hairs; disc of T2 densely clothed with shorter, concolorous hairs; discs of T3–T5 with successively longer, short, erect, blackish hairs; broad white posterior tergal fringes on T1–T5, sparse on T1 and narrower on T5; T2 without basal tomentum; S2–S5 with sparse, indistinct fringe of longer, greyish white hairs, discs covered with relatively long hairs.

Integument: Completely black, except antenna dark brown ventrally, tarsi partly reddish brown and terga narrowly translucent posteriorly; malar area long, length about 1.2× width of mandibular base; clypeus with scattered (0.5 pd), medium-sized, round punctures; integument between punctures smooth and shiny; facial fovea broad, maximum width about 2× antennal diameter; disc of mesonotum with scattered (1–2 pd), medium-sized punctures, integument smooth and shiny, surrounded by slightly denser (0.5–1 pd) punctation; upper sloping part of propodeal triangle with short longitudinal carinae, vertical part glabrous, anteriorly with 1 or 2 weakly developed, roughly transverse carinae; disc of T1 with very fine, scattered granulation (1–2 pd) that becomes a little denser on posterior tergal depression, integument very finely and superficially shagreened; disc of T2 of same structure.

Male. Unknown.

Holotype: ♀ SOUTH AFRICA: *Western Cape*: Lamberts Bay, 4.x.1974, R. Watmough (SANC).

Paratypes: SOUTH AFRICA: *Western Cape*: 26♀ same data as holotype (SANC, CMK); 1♀ Pakhuis Pass, 7.ix.1987, C.D. Eardley (SANC); 6♀ Clanwilliam, Ramskop Camp, 23.viii.1984, V.B. Whitehead & M. Macpherson, on *Homeria miniata* (SAMC); 1♀ Clanwilliam, Ramskop Camp, 23.viii.1984, V.B. Whitehead & M. Macpherson, on *Trachyandra muricata* (SAMC); 4♀ Peerboomskloof Pass, 86 km E Ceres, 785 m, 24.ix.2001 (CUIC, CMK).

Distribution: This species is only known from the south-central part of the winter rainfall area (Fig. 43).

Flower visiting: *Trachyandra muricata* (Asphodelaceae), *Homeria miniata* (= *Moraea miniata*) (Iridaceae).

Phenology: First record 23rd August, last record 4th October.

Remarks: This species is treated as *Colletes* sp. F in Kuhlmann (2006).

Colletes zygophyllum sp. n.

Fig. 43

Etymology: Named for the plant genus *Zygophyllum* (Zygophyllaceae) that is the preferred pollen source of this species.

Diagnosis: The species is well characterised by the broad white to whitish brown posterior tergal bands.

Description:

Female.

Length 12–13 mm.

Vestiture: Face yellowish brown with blackish hairs intermixed along inner eye margins and on vertex; mesonotum with short, yellowish brown hairs intermixed with numerous longer, blackish hairs; mesosomal sides and legs yellowish to yellowish brown, scutellum and metanotum with short orange-brown hairs, scutellum with orange-brown intermixed with longer blackish hairs; scopa dark brown dorsally and yellowish brown ventrally; T1 densely covered with long, erect, yellowish brown hairs; disc of T2 very densely covered with very short, brownish hairs; discs of T3–T5 with successively longer, short, erect, blackish hairs; very broad whitish to whitish brown posterior tergal hair bands on T2–T4, distinctively narrower on T1 (narrowed medially) and T5; T2 with very narrow, indistinct basal tomentum; S2–S4 with sparse fringe of longer, yellowish white hairs, discs covered with long hairs.

Integument: Completely black, except tarsi sometimes slightly brownish and T1 narrowly translucent posteriorly; malar area short, length about 1/2 width of mandibular base; clypeus with dense (0.2 pd), medium-sized punctures, punctures slightly elongate but with straight orientation; integument between punctures smooth and shiny; facial fovea narrow, maximum width about 3/4 of antennal diameter; disc of mesonotum without or with very scattered (2–3 pd), coarse punctation, integument smooth and shiny, surrounded by dense (< 0.5 pd) punctation; upper sloping part of propodeal triangle with short, longitudinal carinae, vertical part superficially shagreened and slightly dull; disc of T1 with distinct, fine, dense (0.5–1 pd) punctation, punctures becoming finer, more shallow and denser towards posterior tergal depression, nearly disappearing at margin; disc of T2 with fine, dense (< 0.5 pd) punctation; integument between punctures smooth and shiny.

Male. Unknown.

Holotype: ♀ SOUTH AFRICA: *Northern Cape*: Nieuwoudtville, Wild Flower Reserve, 27.viii.1984, V.B. Whitehead & M. Macpherson, on *Zygophyllum* (SAMC).

Paratypes: SOUTH AFRICA: *Northern Cape*: 2♀ same data as holotype (SAMC); 1♀ Nieuwoudtville, Wild Flower Reserve, 29.viii.1984, V.B. Whitehead & M. Macpherson, on *Zygophyllum* (CMK); 1♀ Sutherland, 29.7 km NW, 22.ix.1985, V.B. Whitehead (SAMC); 1♀ Nieuwoudtville, Wild Flower Reserve, 730 m, 1.ix.2002, M. Kuhlmann (CMK); 2♀ 5.ix.2002, 2♀ 12.ix.2002, 3♀ 13.ix.2002, 1♀ 16.ix.2002, idem; 1♀ Nieuwoudtville, Wild Flower Reserve East, 735 m, 12.viii.2004, M. Kuhlmann (CMK); 1♀ 21.viii.2004, idem.

Distribution: This species is only known from the south-central part of the winter rainfall area (Fig. 43).

Flower visiting: *Zygophyllum* sp. (Zygophyllaceae).

Phenology: First record 12th August, last record 22nd September.

Remarks: This species is treated as *Colletes* sp. G in Kuhlmann (2006).

ACKNOWLEDGEMENTS

The following persons and institutions are thanked for the loan of material: F.W. Gess (AMGS); J.G. Rozen (AMNH); T.L. Griswold (BLCU); G. Else (BMNH); M. Cochrane (SAMC); C.D. Eardley (SANC); M. Engel and C.D. Michener (SEMC); P. Bayliss (TMSA); F. Koch (ZMHB); B.N. Danforth (CUIC); C. Mayer (CCM). W. Ahlrichs, Oldenburg (Germany), kindly helped with making the SEM photographs. I am very much indebted to Connal Eardley for his critical reading of the manuscript.

REFERENCES

Cockerell, T.D.A. 1937. Descriptions and records of bees. CLIX. *Annals and Magazine of Natural History* (Ser. 10) **19**: 136–143.

———1945 (1946). African colletid bees. *Annals and Magazine of Natural History* (Ser. 11) **12**: 836–851.

———1946 (1947). African colletid bees. *Annals and Magazine of Natural History* (Ser. 11) **13**: 199–203.

Friese, H. 1909. Die Bienen Afrikas nach dem Stande unserer heutigen Kenntnisse. *In*: Schultze, L., ed., Zoologische und anthropologische Ergebnisse einer Forschungsreise im westlichen und zentralen Südafrika ausgeführt in den Jahren 1903–1905 mit Unterstützung der Kgl. Preußischen Akademie der Wissenschaften zu Berlin, Band 2. *Denkschriften der Medizinisch-Naturwissenschaftlichen Gesellschaft zu Jena* **14**: 83–476.

———1925. Die Seidenbienen des tropischen Afrika. (*Colletes* Latr. Hym.). *Zoologische Jahrbücher, Abteilung für Systematik, Geographie und Biologie der Tiere* **49**: 520–529.

Kuhlmann, M. 1998. Lectotype designation and new synonymy for afrotropical and oriental bees of the genus *Colletes* Latr. (Hymenoptera, Apidae, Colletinae). *Linzer biologische Beiträge* **30**: 559–577.

———2002. Neue paläarktische Arten der Bienengattung *Colletes* Latr. mit Anmerkungen zu weiteren Arten der Alten Welt (Hymenoptera: Apidae: Colletinae). *Linzer biologische Beiträge* **34**: 743–770.

———2006. Scopa reduction and pollen collecting of bees of the *Colletes fasciatus*-group in the winter rainfall area of South Africa (Hymenoptera: Colletidae). *Journal of the Kansas Entomological Society* **79**: 165–175.

Michener, C.D. 1944. Comparative external morphology, phylogeny, and a classification of the bees (Hymenoptera). *Bulletin of the American Museum of Natural History* **82**: 156–326.

———1979. Biogeography of the bees. *Annals of the Missouri Botanical Garden* **66**: 277–347.

———1989. Classification of American Colletinae (Hymenoptera, Apoidea). *University of Kansas Science Bulletin* **53**: 622–703.

———2000. *The bees of the world*. Baltimore: John Hopkins University Press.

Noskiewicz, J. 1936. Die paläarktischen *Colletes*-Arten. *Prace Naukowe Wydawnictwo Towarzystwa Naukowego we Lwowie* **3**: 1–531.

Smith, F. 1853. *Catalogue of hymenopterous insects in the collection of the British Museum. Part I. Andrenidae and Apidae*. London: Taylor and Francis.

Stephen, W.P. 1954. A revision of the bee genus *Colletes* in America north of Mexico. *University of Kansas Science Bulletin* **36**: 149–527.

APPENDIX 1

Gazetteer listing in alphabetical order the latitude and longitude of localities where specimens were collected.

NAMIBIA

Aurusberg: 27°40'S:16°23'E
Grootfontein: 19°35'S:18°07'E
Klinghart Mts: 27°18'S:15°45'E
Prince of Wales-Bay: 27°06'S:15°15'E

SOUTH AFRICA

Algoa Bay: 33°58'S:25°36'E
Atlantis: 33°34'S:18°28'E
Barrydale, 48 mi. E: 33°54'S:21°21'E
Biedouw Valley: 32°08'S:19°14'E
Bloomfontein (Farm): 31°54'S:20°14'E
Blouwberg Strand: 33°57'S:18°27'E
Brandfontein Reserve: 34°46'S:19°52'E
Cape: 33°57'S:18°27'E
Cape of Good Hope Nature Reserve, Olifantsbos: 34°16'S:18°23'E
Cape Town, Lion's Head: 33°58'S:18°23'E
Ceres: 33°21'S:19°18'E
Citrusdal: 32°37'S:19°00'E
Clanwilliam: 32°11'S:18°53'E
Clanwilliam, 10 km N: 32°05'S:18°50'E
Clanwilliam, 6.2 km S on the old Citrusdal Road: 32°11'S:18°53'E
Clanwilliam, Nardouw: 32°11'S:18°53'E
Clanwilliam, Ramskop Camp: 32°10'S:18°52'E
Darling: 33°22'S:18°21'E
Darling to Yzerfontein: 33°21'S:18°15'E
De Doorns: 33°27'S:19°39'E
Droogerivier (Farm), Sandberg: 32°18'S:18°37'E
Eland's Bay: 32°15'S:18°20'E
Elim, Touws River to Verkeerdevlei: 33°21'S:19°56'E
Engelsepunt, 15 km NW Nieuwoudtville: 31°14'S:18°59'E
Garies: 30°30'S:18°00'E
Glen Lyon, S Nieuwoudtville: 31°23'S:19°08'E
Goegap Nature Reserve: 29°38'S:17°59'E
Graafwater, 5 km W: 32°09'S:18°25'E
Grahamstown: 33°18'S:26°31'E
Groenriviersmond coast: 30°51'S:17°34'E
Hester Malan Nature Reserve (see: Goegap Nature Reserve)
Hondeklip Bay: 30°19'S:17°17'E
Hondeklip Bay, Farm Diknek: 30°19'S:17°17'E
Hondeklip Bay, road to: 30°23'S:17°31'E
Hopefield: 33°22'S:18°20'E
Hout Bay, opposite of Duiker Island: 34°04'S:18°21'E
Joostenbergkloof: 33°58'S:18°57'E
Kalkgat (Farm), 55 km NE Vanrhynsdorp: 31°07'S:18°55'E
Karkams, 8 km E: 30°52'S:17°18'E
Klawer, 7 km N: 31°47'S:18°38'E
Klein Alexandershoek to Het Kruis: 32°20'S:18°46'E
Knersvlakte: 31°33'S:18°40'E
Knersvlakte, 48 km N Vanrhynsdorp: 31°14'S:18°32'E
Kommetjie: 34°08'S:18°20'E
Kunje Farm, 28 km SE Citrusdal: 32°40'S:19°10'E
Ladismith: 33°29'S:21°17'E
Lamberts Bay: 32°04'S:18°20'E
Lamberts Bay, 20 km E: 32°08'S:18°28'E
Lamberts Bay, 21 km E: 32°08'S:18°28'E
Leliefontein: 30°19'S:18°05'E
Mamre: 33°31'S:18°29'E
Matjesfontein: 33°14'S:20°35'E
Matroosberg Station: 33°45'S:19°50'E
Meirings Poort, Spitzkop: 33°30'S:22°21'E
Milnerton: 33°57'S:18°27'E
Montagu: 33°47'S:20°07'E
Montagu, 27 mi. E: 33°47'S:20°34'E
Nieuwoudtville, Glen Lyon (farm): 31°23'S:19°08'E
Nieuwoudtville, Willemsrivier: 31°18'S:19°06'E
Nieuwoudtville, Wild Flower Reserve: 31°22'S:19°07'E
Okiep: 29°35'S:17°52'E
Onrus: 34°23'S:19°10'E
Ouberg Pass, by road 31 km NE of Montagu: 33°38'S:20°17'E
Oudtshoorn, Dam near: 33°39'S:22°13'E
Pakhuis Pass: 32°08'S:19°02'E
Pearly Beach, Bredasdorp: 34°40'S:19°30'E
Peerboomskloof Pass, 86 km E Ceres: 32°52'S:19°43'E
Port Nolloth: 29°17'S:16°51'E
Port Nolloth, 40 km N: 28°54'S:16°44'E
Rapenburg, Cape Flats: 33°57'S:18°27'E
Remhoogte, Paulshoek: 30°14'S:18°10'E
Riviersonderend, Greyton: 34°08'S:19°54'E
Robertson: 33°48'S:19°53'E
Rooiwaal, Paulshoek: 30°14'S:18°10'E
Sandberg Station, Droogerivier: 32°18'S:18°37'E
Seven Weeks Poort: 33°21'S:21°25'E
Steinkopf: 29°19'S:17°44'E
Stellenbosch: 33°56'S:18°51'E
Struisbay, 15 km NW: 34°42'S:19°56'E
Sutherland, 29.7 km NW: 32°25'S:20°40'E
Touws River, half way to Hotnotskloof: 33°16'S:20°21'E
Uniondale: 33°40'S:23°10'E
Vanrhynsdorp: 31°36'S:18°45'E
Vanrhynsdorp, 2 km N: 31°36'S:18°45'E
Vanrhynsdorp, 20 km N: 31°26'S:18°41'E
Vanrhynsdorp, 30 km N: 31°22'S:18°42'E
Vanrhynsdorp, 45 km NE: 31°03'S:18°57'E
Vermont: 34°26'S:19°10'E
Vermont Dune: 34°26'S:19°10'E
Wallekraal, 7 km WNW on road to Hondeklip Bay: 30°23'S:17°31'E
Willowmore: 33°18'S:23°30'E
Wolwekraal (Farm), 33 km E Steytlerville: 33°34'S:24°21'E
Worcester: 33°39'S:19°26'E
Ysterfontein: 33°21'S:18°09'E
Zeerust: 25°31'S:26°04'E

ZAMBIA

Mbala (Abercorn): 08°50'S:31°22'E